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OIL WORLD
and Petroleum Industry

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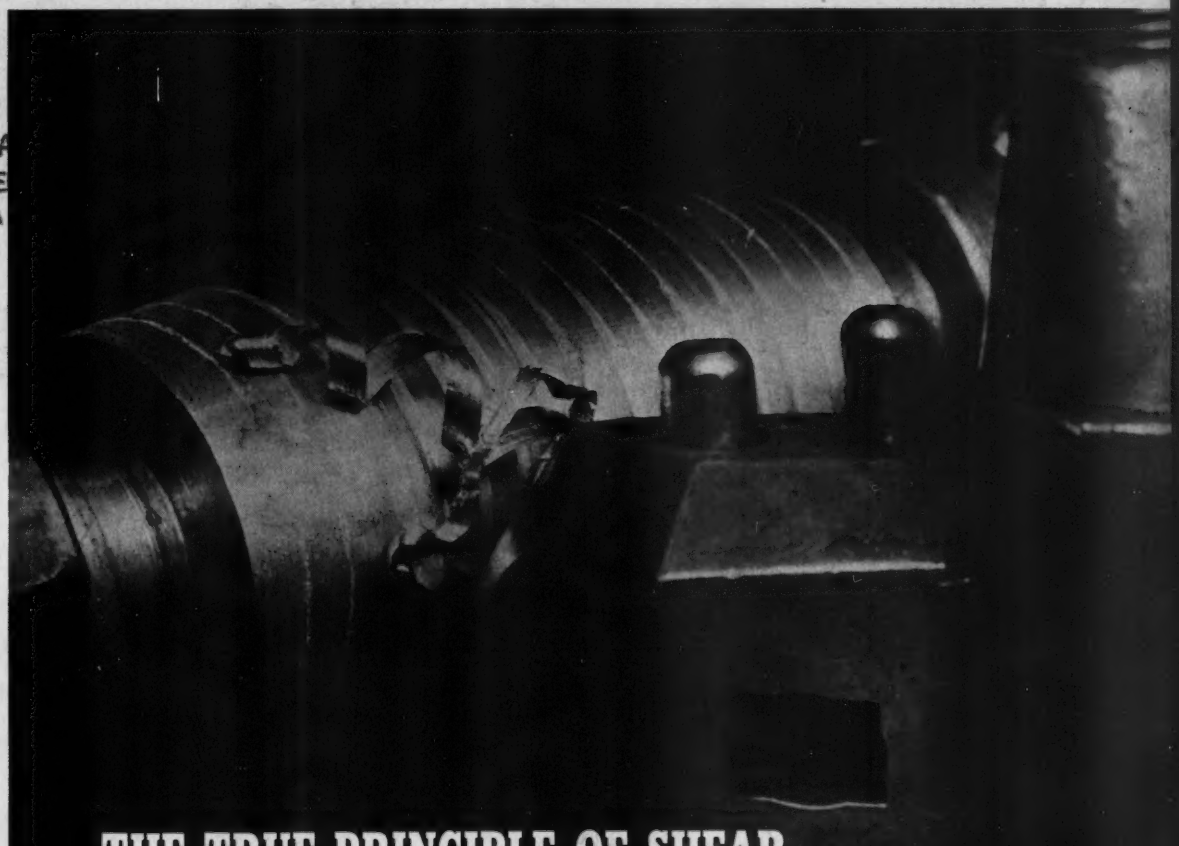
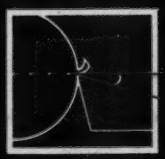
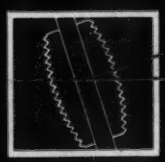


THE TRUE PRINCIPLE OF SHEAR



Whether you're cutting metal in a lathe, or formation in a well, the principle is the same—only a shearing action gives true cutting efficiency!

The illustration at the left from the Mechanical Engineer's Handbook, shows the correct cutting angle for greatest lathe efficiency. Note how the cutting edge meets the stock at an angle that shears the metal away smoothly and rapidly.



The Sievers Reamer also operates on a true shearing principle. The cutters, set at a carefully determined angle, slice into the formation with a smooth shearing action that quickly removes formation from the walls of the well and stabilizes the rotation of the drill string. Only the Sievers Reamer has this true shearing principle!

SECURITY ENGINEERING CO., INC.
WHITTIER CALIFORNIA
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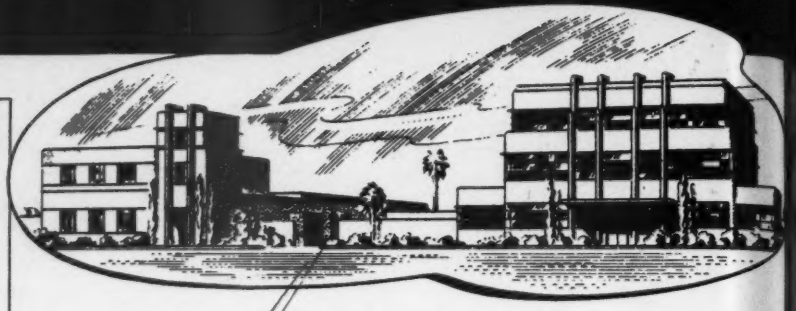
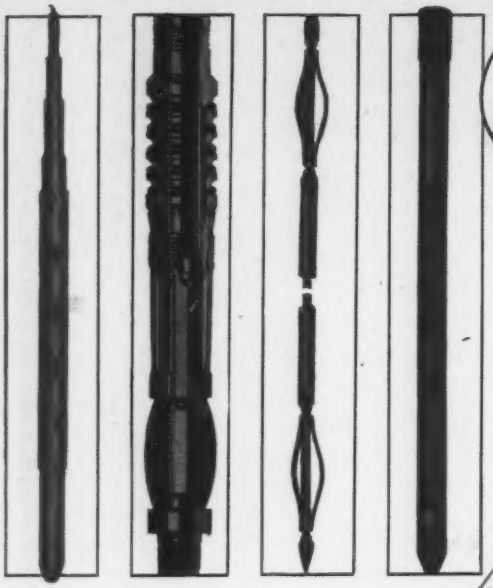
SIEVERS REAMERS

A STRAIGHT LINE, Is Still THE SHORTEST DISTANCE BETWEEN TWO POINTS!





Lane-Wells Gun Perforators
Meet all demands of oil producers in selective completion and remedial programs. Increase production with marked savings in time and expense. Effective penetration obtained under all known well conditions.

Lane-Wells Production Type Packer
Provides a positive seal, using the same inside diameter as the tubing. Can be run into the hole rapidly without hazard of floating or premature setting.

Photo-Record Go-Devil
May be run into the drill pipe to land on a catcher inserted above the bit. Used for measuring the inclination of drilling wells. Readings can be taken at any time.

Photo-Record Single Shot Survey Instrument
Measures both inclination and direction in open hole. It is run in on sand line in an outer case. Small diameter instruments are also available.

In this group of new Lane-Wells buildings in Los Angeles more than four hundred persons are busily engaged in the work of helping operators to get more oil at less cost. ¶From these buildings go tools and services to every ***major oil field in the world.*** These tools and services provide short cuts to production—***straight line methods*** of arriving directly and scientifically at desired and profitable results. ¶Benefits to operators are summed up in fourteen million feet of hole already accurately surveyed and kept straight—in ten thousand wells that have been Gun Perforated and made productive. ¶Lane-Wells tools, instruments and services are needed in every new well from the time drilling begins until bottom is reached—and in every old well that shows an unprofitable decline in production. ¶Detailed information about tools shown on this page is available in Lane-Wells Bulletins. Send for what you want.

Tomorrow's Tools Today

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Lane-Wells Services and Products include: GUN PERFORATORS • OIL WELL SURVEYS • DIRECTION CONTROL OF DRILLING WELLS • PACKERS • LINER HANGERS • BRIDGING PLUGS • SINGLE-SHOT SURVEY INSTRUMENTS • KNUCKLE JOINTS • WHIPSTOCKS AND MILLS

TUNNELL WOOD & NEILAN, INC.

OIL WELL SUPPLIES

Los Angeles

Bakersfield

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Byron-Jackson Tools
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Gatke Brake Lining
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Saunders Swabs and Oil Savers
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Powell Steel, Iron and Brass Valves
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Inferno Gauge Cocks and Water Gauges
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Wilmington

CALIFORNIA
OIL WORLD
and Petroleum Industry

THE AUTHORITY ON THE CALIFORNIA OIL INDUSTRY

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IN THIS ISSUE

Continental Breaks Deep Well Records 4

C.N.G.A. Section

Production Characteristics of Flowing Wells 24

Los Angeles Basin Developments 40

San Joaquin Valley Developments 44

Coastal District Developments 47

State Drilling Report 49

Laugh This Off 50

Business Directory 52

THE OIL COMPANY SERIES

Due to unforseen difficulties in the historical research necessary to a complete story of the development of The Petrol Corporation in the California Oil World series of histories of California oil companies, the publishers are forced to postpone the second article of The Petrol Corporation history to the issue of Mar. 5, when it will be completed.

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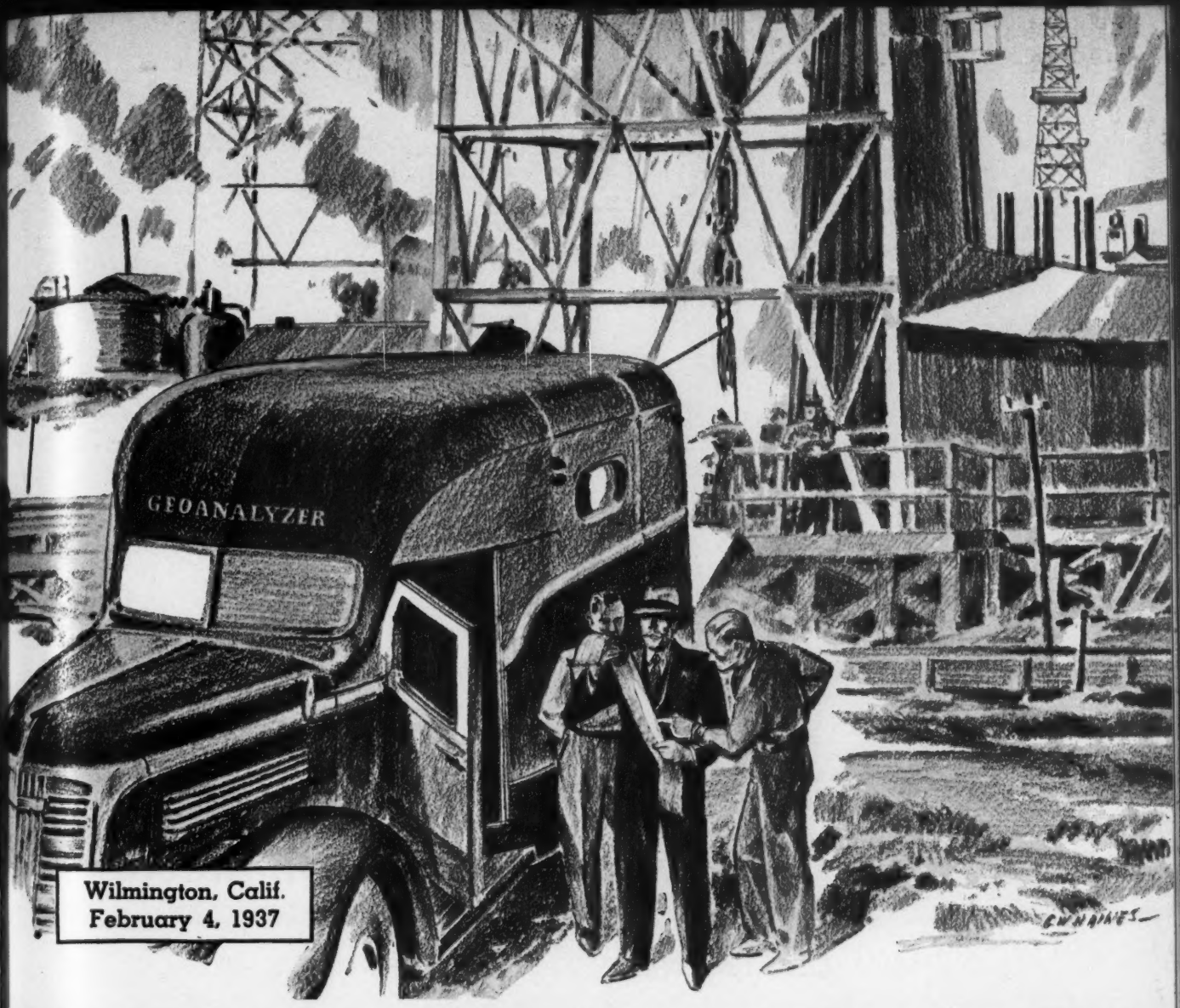

HESE MEN KNEW WHAT OTHERS ONLY GUESSED

From Geoanalyzer's mobile dark room, an engineer brings a strip of film. Men excitedly gather around. In this huddle is disclosed for the first time the determining features of the Wilmington Oil Field. An existing fault is found which has influenced oil accumulation in this vast Wilmington pool. Days before the news is out these men know.

This story of the Wilmington Oil Field has been but one Geoanalyzer achievement in electric logging. The many Geoanalyzer achievements comprise a story of advanced scientific methods by men who know oil producing problems. Consequently, the oil industry moves forward on a sounder basis through electric logging. Geoanalyzer has brought this new era to electric logging, an era in which advanced methods have increased accuracy and made way for better service to oil men. Specifically, Geoanalyzer is contributing to this new era by major improvements in methods, developments in equipment, and not least—quicker service.

Next time you have a job for electric logging —call Geoanalyzer. Swift, mobile laboratories are available anywhere, any time.

LOGGING THE WORLD'S DEEPEST HOLE

1,300 feet logged at 12,879 foot level in recorded study made, and out in two hours. Geoanalyzer provided accuracy and speed in logging the world's deepest hole.

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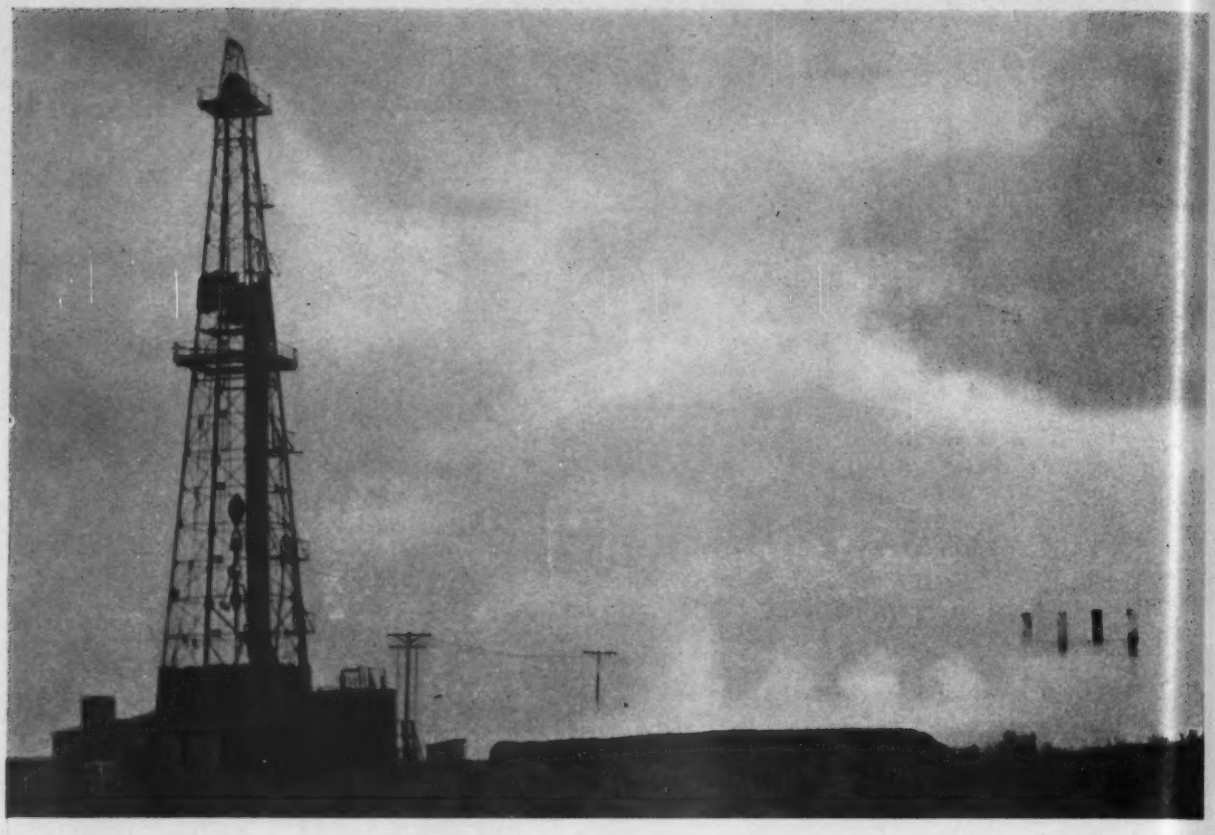


Continental Breaks Deep Well Record

K. C. L. A-2 Drilling Below 13,709 Feet. On Flats Near Wasco, Sec. 8, 27-24.

Spudded June 25, 1937, Continental Oil Co.'s wildcat well No. K. C. L. A-2 drilling in the flat country five miles west of Wasco in sec. 8, 27-24, was exploring in hard shale at 13,709 ft., 923 feet deeper than any well ever drilled before. Quite as important as what the 6-in. bit will find is the proof given that the limits of deep well drilling have been pushed far ahead, that wells can be drilled more than two and a half miles into the earth with bottom remaining under the derrick floor, and that men and equipment now make the accomplishment appear no more difficult than a routine drilling job.

The K. C. L. A-1 deep test in this area suspended drilling at 9591 ft., Apr. 26, 1937. The 4-in. drill pipe had frozen at 9303 ft., and drilling was continued through the drill pipe to 9591 ft. While not a commercial producer, this well presented a puzzle that K. C. L. A-2 is hoping to solve when it flowed five barrels a day and continues to do so. The oil in the A-1 well comes from broken shale and chert. At its present depth the A-2 well is still in the Miocene, and finding considerably easier going after passing an extremely hard formation.

As we go to press Continental's K.C.L. A-2 wildcat is drilling in hard brown shale at a depth of 13,709 ft., and Continental gives no indication that the test is nearing abandonment. Oil shows have been found at several levels. There is no hint of increasing mechanical difficulties.

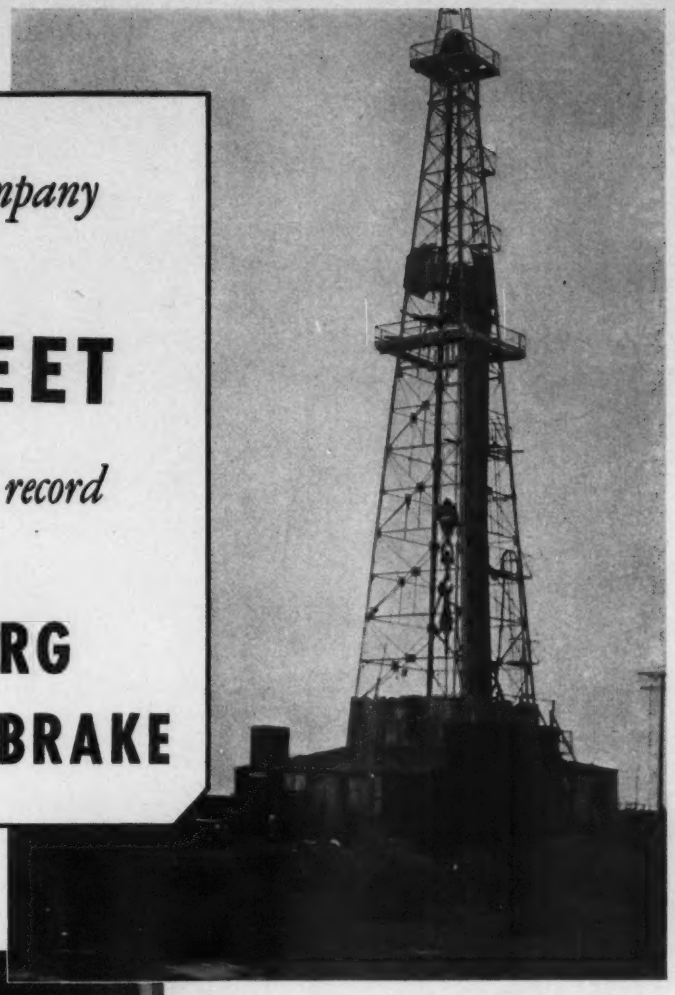
There have been some oil shows and present indications in K. C. L. A-2 are not discouraging. The test was drilled through 500 feet of 16-in. surface pipe, and reached a depth of 5500 feet in 13 days where a string of 10¾-in. casing was set. This string was set to case off badly heaving shales which occurred in the first 5000 feet. The extreme difficulties that were encountered in passing through this formation in the first well were largely overcome by the use of silicate of soda in the

Continental Oil Company drills to

13,709 FEET

and a new world's record using a

PARKERSBURG HYDROMATIC BRAKE



Hats off to Continental Oil Company and the crew who drilled Well No. KCL A-2 to 13,709 feet and a new world's record. Theirs was a notable and praiseworthy achievement.

We are proud that the Parkersburg Hydromatic Brake played a part in this undertaking and again proved itself indispensable in modern deep drilling operations. It not only provided the crew with the greatest possible degree of safety but saved hundreds of dollars in brake maintenance costs.

THE PARKERSBURG RIG & REEL CO.

Parkersburg, W. Va.

716 E. 60th STREET, LOS ANGELES, CALIF.

CONTINENTAL HAS A RIGHT TO BE PROUD

In spite of the trend towards deeper and deeper wells, a 13,000 + footer is still something to talk about, and the Continental Oil Company has every right to be proud of its K.C.L. A-2 —it represents a real achievement.

A Baker Cement Whirler Float Shoe and a Baker Cement Float Collar were, of course, used to safely guide, float and cement the 11,570 foot string of 7" casing.

But landing and cementing this record string is not particularly an achievement for Baker, but is simply a routine performance that operators have come to expect and do receive when Baker Cement Guiding, Floating, Cementing Equipment is used.

Thus whether it is a 3300 or 13,000 foot well the factor of Safety and Efficiency that is built into every piece of Baker equipment insures operators uniformly consistent satisfactory results.

For complete details concerning the Strength, Valve Efficiency and Drillability of Baker Cement Guiding, Floating, Cementing Equipment see the Baker Section of your 1938 Composite Catalog.

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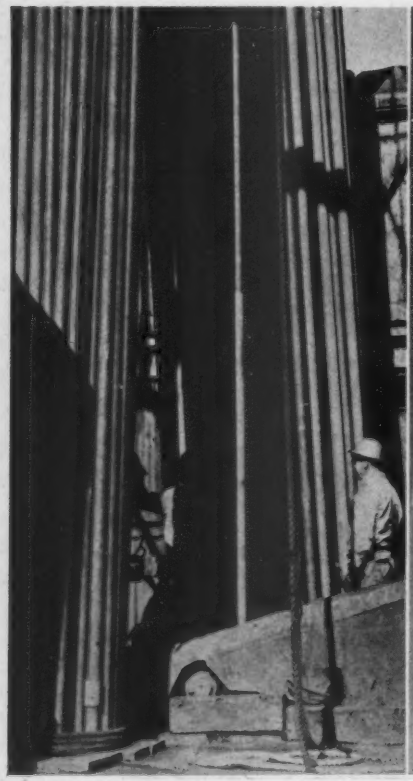
Right—R. E. Collom, in charge of Continental's California operations, with A. H. Bell, general superintendent.

mud, which acts to seal the walls of the hole preventing water slacking.

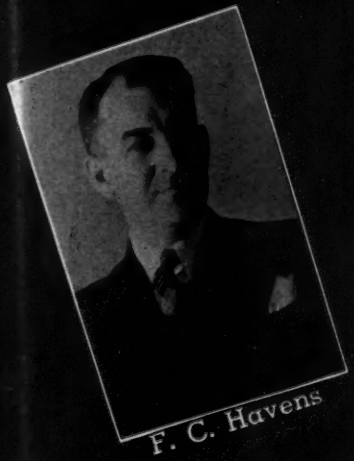
K. C. L. A-2 was drilled ahead using rock bits entirely through a massive shale body, and a depth of 11,000 feet was reached in 96 days. At the end of 121 days the well had reached a depth of 11,580 feet where a massive sand body was found, and because of the 101-pound mud necessary to hold the oil and gas showings in the shale above, the bit stuck in the sand. After a long fishing job recovering the drill pipe, 11,572 feet of 7-in., 30-pound "Extreme Line" casing was run. This run was made in eight and a half hours, with a high run of 1790 feet in one hour. This is the longest string of pipe of any size that has ever been run in a California well. After cementing and testing the sand which proved to be non-productive, the well was started ahead after 68 days lost time.



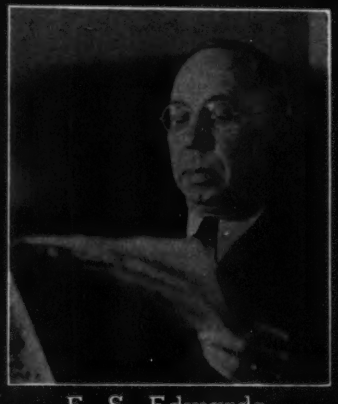
R. M. Barnes

F. E. Minshall

Olin Lane



F. C. Havens



E. S. Edwards

E. H. Vallat

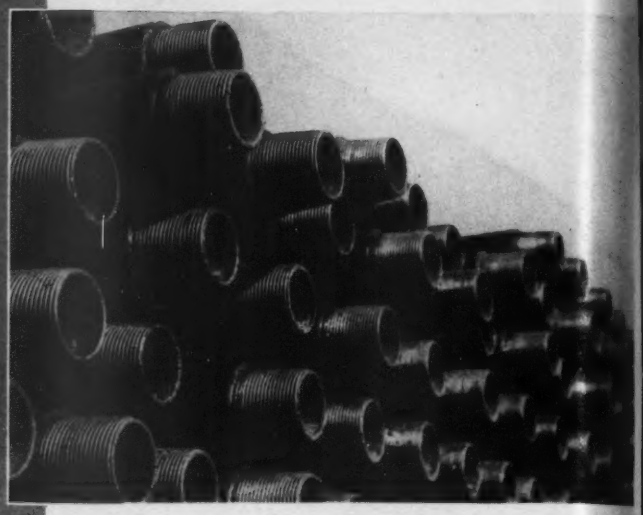
E. W. Webb

H. V. Hobson

Glenn H. Bowes

The New WORLD'S RECORD

CONTINENTAL
OIL COMPANY'S
No. KCL A-2
WEST OF
WASCO,
CALIFORNIA
13,709
FEET



J. C. CRAIG,
TOOL PUSHER
HOLDING THE
REED
CORE DRILL
HEAD THAT
BROKE THE
WORLD'S RECORD

REED
INTERNAL FLUSH SHRINK GRIP
TOOL JOINTS
USED IN THE DRILLING OF
THIS WELL TO A DEPTH
OF APPROXIMATELY 12,000 FT.

L. J. HOPKINS, tool pusher and JOHN GRIER,
drilling foreman.

REED ROLLER

and REED PRODUCTS

REED
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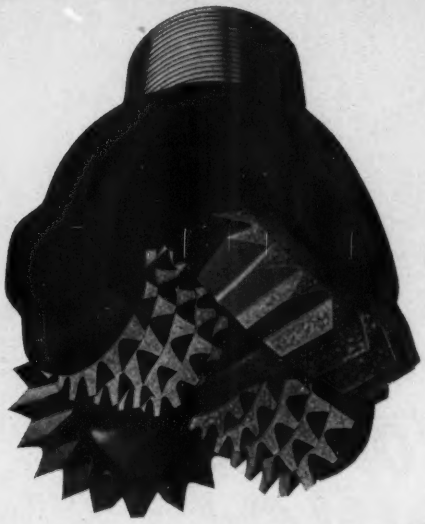
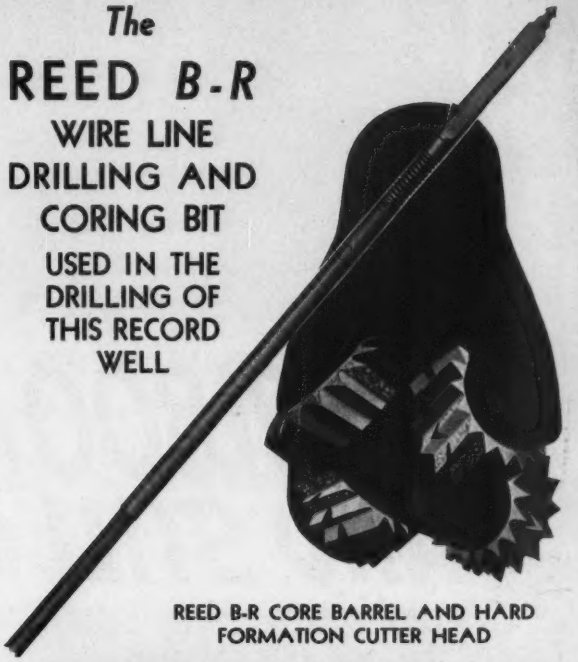
ED IN THE
ILLING OF
S RECORD
WELL



The REED *DK* ROCK BITS
USED IN THE DRILLING OF THIS
WORLD RECORD WELL

The
REED *B-R*
WIRE LINE
DRILLING AND
CORING BIT
USED IN THE
DRILLING OF
THIS RECORD
WELL

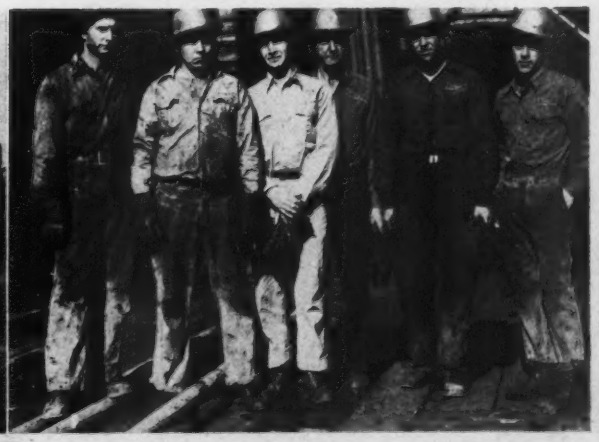


REED B-R CORE BARREL AND HARD
FORMATION CUTTER HEAD

BUD TAGGART-Driller, L. G. LIESS,
S. W. JONES, RAY CROOKS, J. E. PHILLIPS

L. M. WARDEN-Driller, A. E. NORTON, C. D. PATTON,
B. N. HORNELL, B. L. SMITH, R. D. PACKARD

PAUL ELDER, JIM WEBB-Driller,
R. HORTON, C. LEFFLER, "SLIM" TAYLOR



F. W. BANKS, D. W. BENSON, J. T. CAMPBELL-Driller,
E. E. BARBER, W. W. GILCHRIST, J. T. GROGAN

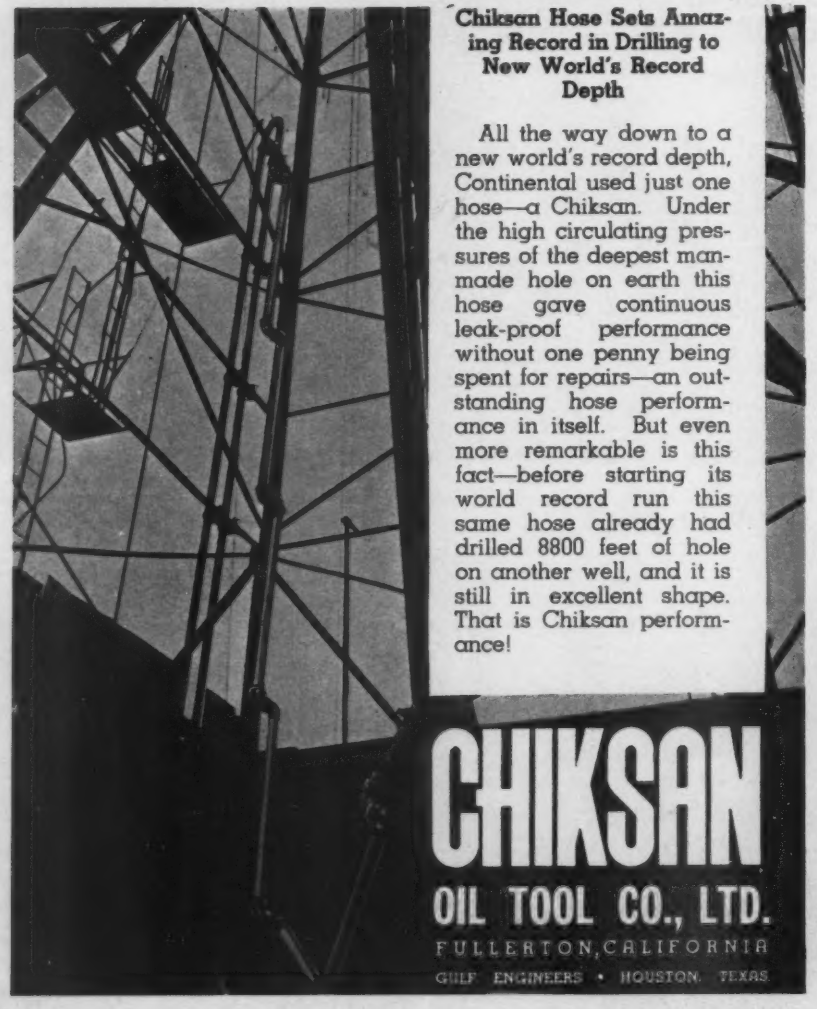
BIT COMPANY

The record of this well speaks eloquently for the intelligence and care exercised by the drilling crews, and the "higher ups" who demonstrate that vision and the pioneering spirit continue as the most valuable assets of the petroleum industry. In charge of all California operations of Continental Oil Co. is R. E. Collom, vice-president. F. E. Minshall is Mr. Collom's engineering assistant, and A. H. Bell is general superintendent of the company in California. E. W. Webb is assistant general superintendent, R. M. Barnes is chief geologist, and Glenn H. Bowes is assistant chief geologist. Olin Lane is superintendent of lands, and E. H. Vallat is geologist in charge of seismograph operations. The resident geologist is C. H. Montgomery.

At the well, John Grier is drilling foreman, L. J. Hopkins is tool pusher, and J. C. Craig is assistant tool pusher. Members of the three drilling crews are as follows: J. T. Campbell, driller; F. W. Banks, D. W. Benson, E. E. Barber, W. W. Gilchrist, and J. T. Grogan. L. M. Warden, driller; A. E. Norton, C. D. Patton, B. N. Hornell, B. L. Smith, and R. D. Packard. Jim Webb, driller; Paul Elder, R. Horton, C. Leffler, and "Slim" Taylor.

The equipment which permitted the drilling crews to handle more than two and a half miles of drill pipe, record breaking strings of casing, and to avoid the dangers presented

OVER 21,800 FEET OF HOLE AND STILL GOING!



Chiksan Hose Sets Amazing Record in Drilling to New World's Record Depth

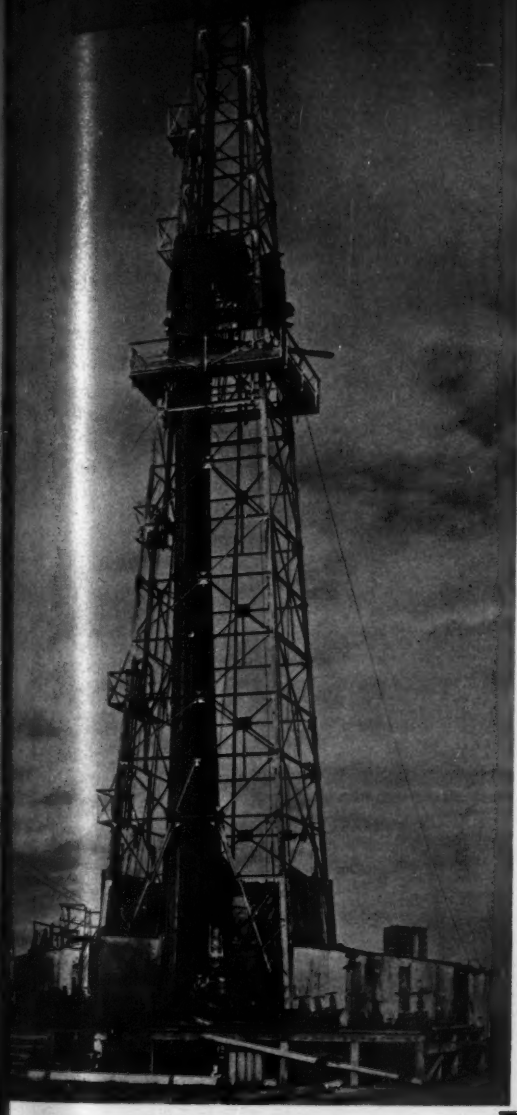
All the way down to a new world's record depth, Continental used just one hose—a Chiksan. Under the high circulating pressures of the deepest man-made hole on earth this hose gave continuous leak-proof performance without one penny being spent for repairs—an outstanding hose performance in itself. But even more remarkable is this fact—before starting its world record run this same hose already had drilled 8800 feet of hole on another well, and it is still in excellent shape. That is Chiksan performance!

CHIKSAN
OIL TOOL CO., LTD.
FULLERTON, CALIFORNIA
GULF ENGINEERS • HOUSTON, TEXAS

TITUSVILLE IRON WORKS CO.

ANOTHER *Record* PARTNERSHIP

HOWARD SUPPLY CO



TO HANDLE ITS COMPLETE LINE IN CALIFORNIA

THE TITUSVILLE IRON WORKS CO. HAS SELECTED HOWARD SUPPLY CO.

During the year just passed, Howard Supply has established an enviable sales and service record in the California oil fields. The splendid engineering background of Howard Supply's sales corps, their facilities for prompt and competent service establish them among the leading supply houses of the oil industry. The Titusville Iron Works Company, founded in 1860 "within a year and a mile of the first Drake oil well," has been devoted exclusively since its establishment to the manufacture of oil field equipment. The progressive policies of the company, the soundness of engineering design, the high-quality material utilized in the construction of Titusville products, and the precision workmanship embodied at each stage of their product manufacture, has placed the name of Titusville Iron Works as second to none. It is fitting, then, that these two organizations, recognized as leaders in their respective fields, should become associated —the Titusville Iron Works in the capacity of manufacturing oil country machinery built with reserve ruggedness,—the Howard Supply Company selling, distributing and servicing this equipment, backed by their slogan "Customer Satisfaction."

TITUSVILLE OIL COUNTRY MACHINERY

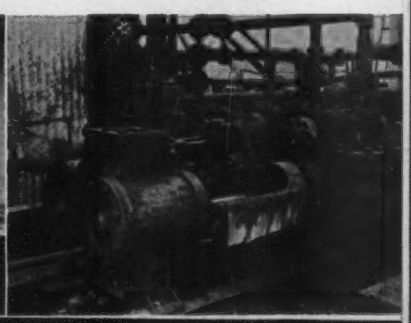
Tico "2" Gas Engines . . . Rotary Drilling Machinery . . . Twin Cylinder Drilling Engines . . . Single Cylinder Steam Engines . . . Band Wheel and Geared Powers . . . Rotary Slush Pumps . . . Four Cycle Gas Engines . . . A.S.M.E. Code Portable Boilers (Locomotive and Return Tubular) . . . Flapper Valve Pumps . . . Air Compressor—Acid Blowers . . . Automatic Gas Separators . . . Heating and Power Boilers . . . Tanks and Steel Plate Work . . . Pressure and Vacuum Valves.

A battery of four 100 h.p. 250-lb. Titusville Acme Boilers are adequately meeting steam requirements on Continental's KCL A-2.

Two 14 x 7¼ x 16 Titusville Acme Steam Slush Pumps are furnishing uninterrupted service on Continental's KCL A-2.

ON CALIFORNIA'S DEEPEST WELL—CONTINENTAL'S KCL A-2

At Wasco, California, Continental's KCL A-2, now drilling at 13,709 feet, (depth today) will probably break all records for depth. Surface equipment on this history-making well includes Titusville Acme Boilers and Acme Slush Pumps.



The TITUSVILLE IRON WORKS Co.

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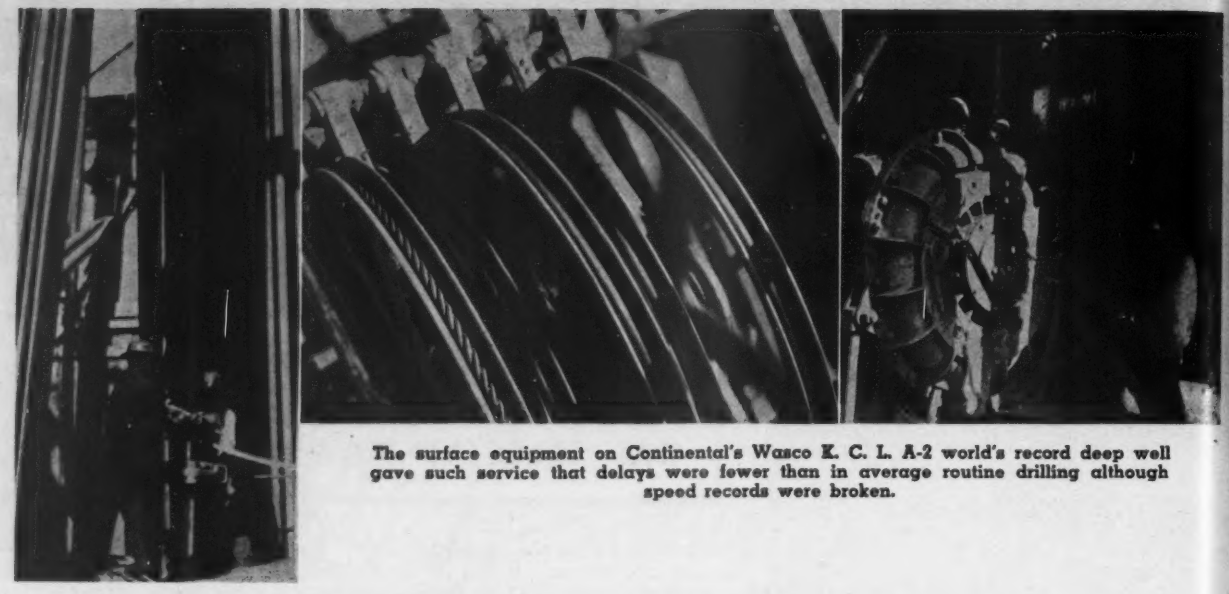
5121 South Santa Fe HOWARD SUPPLY CO. Los Angeles, California



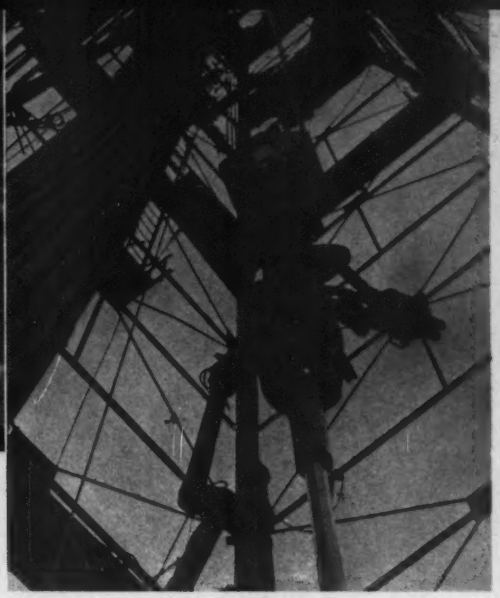
The surface equipment on Continental's Wasco K. C. L. A-2 world's record deep well gave such service that delays were fewer than in average routine drilling although speed records were broken.

GENERALIZED LOG
CONTINENTAL OIL COMPANY
WELL No. K.C.L.-A2

Age	Character	Depth	Feet
Pliocene	Soft sands and silts	0	2,820
	Shale	2,820	4,380
	Bluish gray shales and silty shales	4,380	8,440
Miocene	Grayish brown shales	8,440	9,527
	Cherty brown shales showings of oil and gas	9,527	9,620
	Hard brown shales	9,620	11,581
	Hard sand	11,581	12,175
	Sands and hard brown shales	12,175	12,715
	Oil showing at 12,600		
	Hard dark brown shale	12,715	13,110
	Hard dark brown shale, few thin streaks of hard sand	13,110	13,130
	Oil showing at 13,130		
	Hard dark brown shale	13,130	13,191

by heaving shales, and closely alternating extremely hard and soft formations, have written a record well worth reading and studying. The

As the drill reached record breaking depths, the only changes made in equipment or materials was in lightening the drilling mud which was reduced from 101 pounds to practically that of clear water.

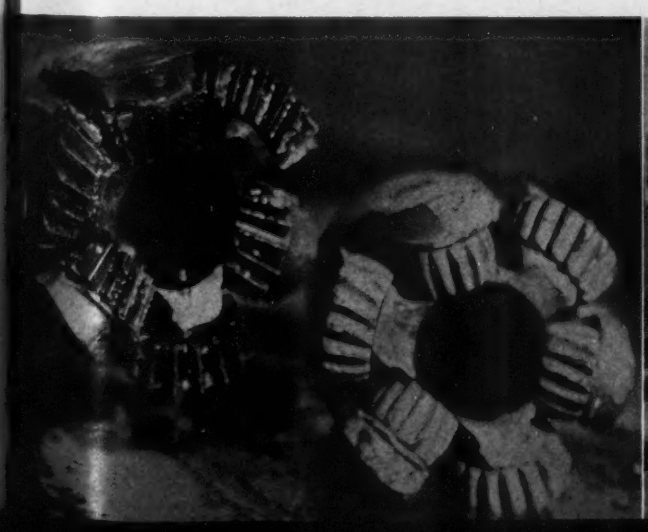


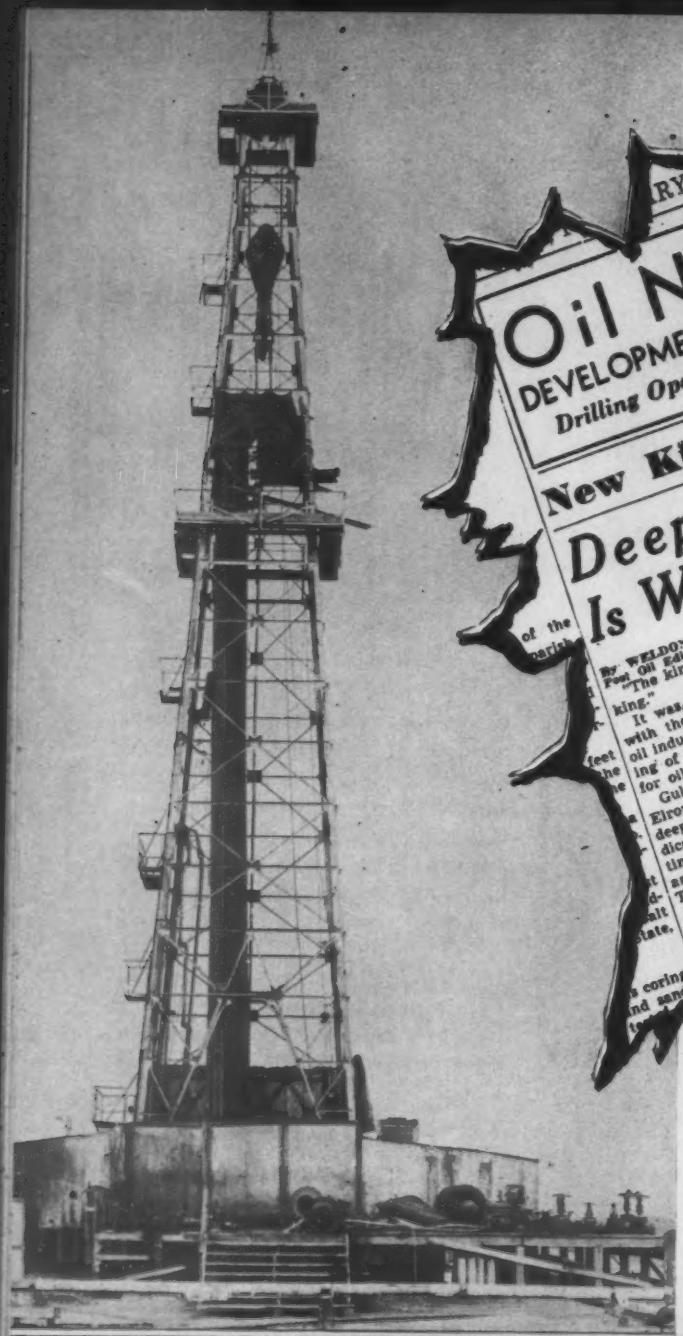
With the precision and speed of well-trained West Pointers, the crews set new records. Grinding through formations which would have defied drillers a few years ago, the hard rock heads gave phenomenal service.

derrick on this "World's Deepest Well" is an Ideco galvanized steel A. P. I. drilling derrick 122 feet high with 6-foot extension and 30-foot A window. It has a capacity of 465,000 pounds. The draw works with which some 200 round trips have been made on this well, is the 34-26 Ideal 4-speed Unitized with 36-inch roller bearing Hydromatic brake, and has seen long service.

In keeping close check on the well Continental "double surveyed" the hole to a depth of 11,500 feet with a Surwell Gyroscopic Clinograph on a wire line. The record shows the in run of the Sperry-Sun Clinograph started at 10 h., 16 m., 35 sec.; bottom was reached at 11 h., 36 m., 12 sec. Out run completed at 12 h., 53 m., 47 sec., for a total time of 2 h., 37 m., 12 sec. Records were taken every 200 feet.

Although the crown block used on this well had been in service in various fields in which Continental operates since 1931, its performance repaid the confidence of the company's engineers with interest. This is a





Penetration of the earth's surface to depths greater than ever attained in the history of drilling is indeed a tribute to the achievement of men and the development of rotary drilling equipment. We extend sincere congratulations to the Continental Oil Company and place credit where due—to the skill and experience of the men who have broken all existing records for depth.

..AND HUGHES ROCK BITS WERE DEPENDED UPON TO GET THE HOLE DOWN IN *Record Time*

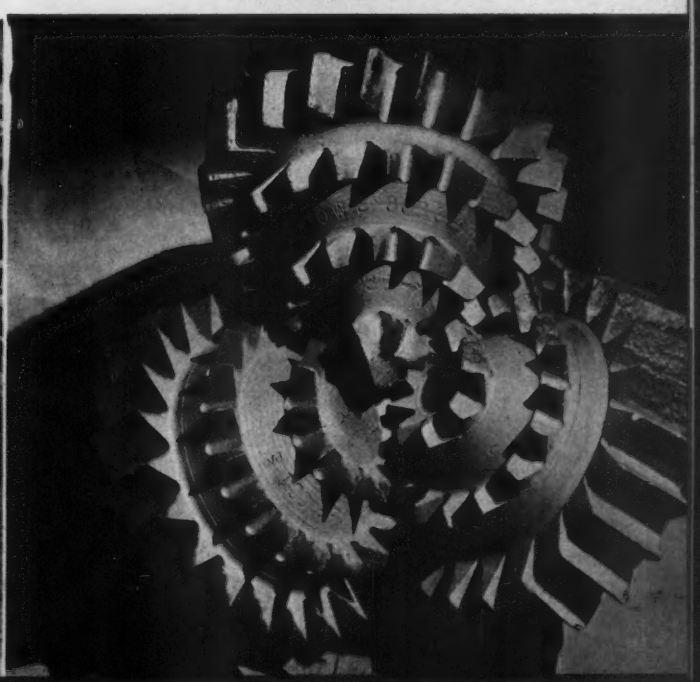
THE FOLLOWING ROCK BITS WERE USED

Depth	HUGHES	Other Makes
5,531'-11,584'	29—9⅞" Hughes Tricones	6—9⅞"
11,584'-13,312'	27—6" Hughes Tricones	4—9⅞"
		1—6"

NOW DRILLING AHEAD
with Hughes Tricone Rock Bits and Hughes Hard Formation Core Heads

HUGHES TOOL COMPANY, HOUSTON, TEXAS

You can Depend on Hughes Tools



ANOTHER World Record Depth
13,000 FT. Plus

Wire Line Coring was used to 11,584 ft.

At the extreme depths when coring became more difficult and recovery vitally important, the following conventional type hard formation core barrels were used exclusively:

Depth	HUGHES	Other Makes
From 11,584′ to 13,312′	35—6″ Hughes Type J hard formation core heads Core Recovery 78.7% **STILL CORING AHEAD with Hughes Hard Formation Core Heads**	4—6″ Core Recovery 68.1%

HUGHES TOOL COMPANY : HOUSTON, TEXAS

HUGHES Hard Formation CORE BITS
Again Preferred
Over 90% of all coring below 11,584 ft.
with Hughes Type "J" Core Bits

ANOTHER "CASE HISTORY" FOR

Standard Seamless

EXTREME LINE

DEPTH OF WELL . . . . . 11,572 FEET

LOCATION . . . . . WASCO, CALIFORNIA

TOTAL RUNNING TIME . . . 10 HRS. 5 MIN.

TIME REQUIRED FOR CHANGING BLOCKS and OTHER DELAYS . . . 1 HR. 45 MIN.

ACTUAL RUNNING TIME

8 HRS. 20 MIN.

On the Wasco Well—Standard Seamless "Extreme Line" Casing made drilling history when 11,572 feet of 30-pound, 7-inch pipe was run in 8½ hours with a high run of 1790 feet in one hour!

SPANG CHALFANT, INC.

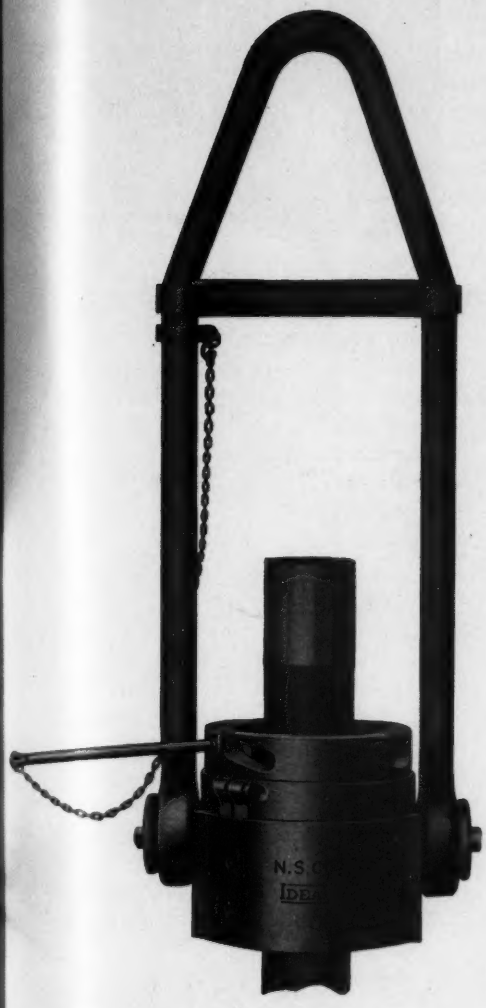
GENERAL OFFICES: GRANT BUILDING, PITTSBURGH, PA.

Sales Offices: Boston New York Pittsburgh Atlanta Chicago St. Louis
Tulsa Houston San Francisco Los Angeles

SPEED AND SAFETY

WERE ASSURED ON THE RECORD
BREAKING CASING RUN BY THE

IDEAL
AUTOMATIC GRIP ELEVATOR AND SPIDER



Setting 11,572 feet of 7" Spang "Extreme Line" Casing in 8 hrs. 20 min. is an outstanding feat and is in no small measure due to the remarkable performance of the Ideal Automatic Grip Elevator and Spider used at the Wasco well. These Elevators and Spiders are made in sizes from 7" to 20" inclusive and have proven themselves in all fields to be one of the safest and most efficient means for setting long strings of casing.

NATIONAL

THE NATIONAL SUPPLY COMPANY

EXECUTIVE OFFICES: PITTSBURGH, PA.
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SURWEL

GYROSCOPIC CLINOGRAPH

Sets a *Remarkable* Record

Continental Oil Company's Deep Well at Wasco was double surveyed to a depth of 11,500 feet with the "SURWEL" Gyroscopic Clinograph on a wire line.

In-run started at - - -	10h 16m 35sec.
Bottom reached at -	11h 36m 12sec.
Out-run completed at -	12h 53m 47sec.
Total time for two surveys - - - - -	2h 37m 12sec.
Closure between In and Out-run - -	9.3′
Maximum temperature recorded - - -	210°F.

Records taken every 200 feet

SPERRY-SUN WELL SURVEYING COMPANY

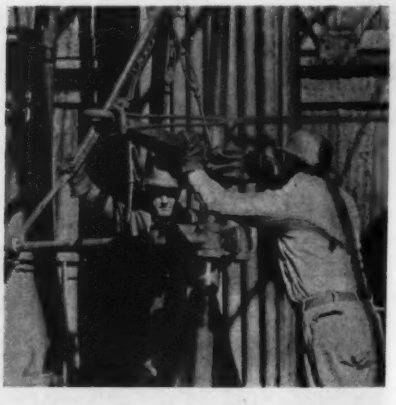
1608 Walnut Street — Philadelphia, Pa.

Tulsa, Oklahoma 425 Petroleum Building	Houston, Texas 3118 Blodgett Avenue	Long Beach, Calif. 549 East Bixby Road (3800 Block—Atlantic Ave.)
Corpus Christi, Texas 332 North Morningside Drive	LaFayette, La. Bank of Lafayette Bldg.	Bakersfield, Calif. c/o Elks Club 17th and I Streets

(U. S. Patents 1,124,068; 1,812,994; 1,898,473; 1,959,141; 1,960,038; 2,006,556; 2,012,138; 2,012,152; 2,012,455; 2,012,456 and others pending)

Regan Type D Double Deck crown block. The only change made in major equipment to handle the increasingly difficult conditions in the deeper drilling was the taking down of a Baash Ross roller bearing traveling block and its replacement with an Emsco A-94 50-inch 5 sheave traveling block.

The 12x12 Ideal Ajax twin cylinder roller bearing steam drilling engine is powered by four 100 h.p. 250-pound Titusville Iron Works boilers equipped with a separate Foster Wheeler portable oilfield superheater. The standby hoist is a Hopper Type SS two drum 4-speed, with 25/55 h.p. motor. One 14½x7½x18 Ideal steam slush pump, and two 14x7¼x16 Acme steam slush pumps are working smoothly under the unusually difficult conditions imposed

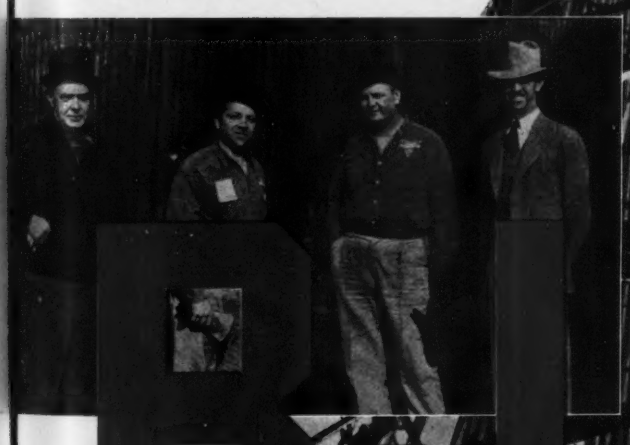


THE DEEPER THEY ARE

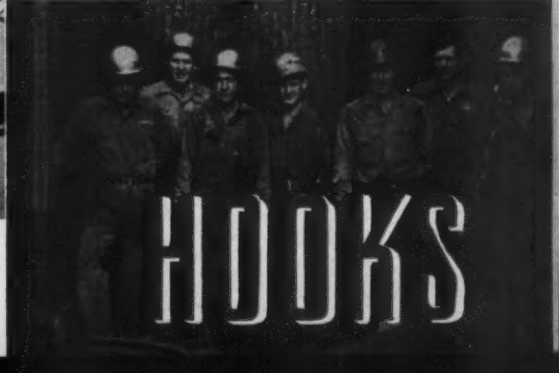
Thank you, executives and crews of Continental Oil Company, for the privilege of demonstrating on your K.C.L. A-2 that "The Deeper They Are, the More You Need BJ Triplex Hooks."

BYRON JACKSON CO.

FORT WORTH • LOS ANGELES • NEW YORK



THE MORE YOU NEED BJ TRIPLEX



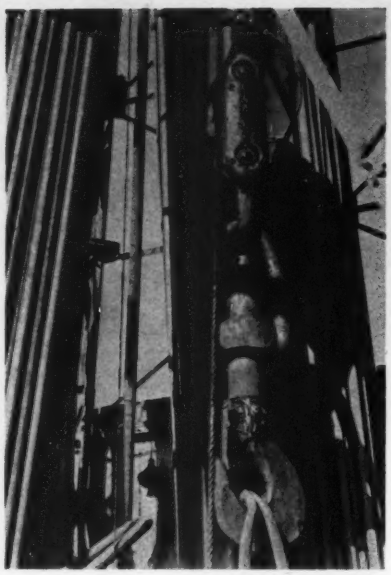
HOOKS

DRILLING LINE RECORD—K.C.L.-A2

Line No.	Size	No. of Lines	Number R. T.	Depth On	Depth Off	Total No. of Feet	Ton Miles
1	1⅛"x2500	8	44	0	10,437	10,437	5,794
2	1⅛"x2500	8	56	10,437	11,584	1,147	4,520
3	1⅛"x2500	8	7	11,584	11,584	.....	886
*4	1⅛"x2500	8	40	11,505	11,583	78	3,419
5	1⅛"x2500	10	34	11,583	12,640	1,057	2,958
6	1⅛"x2500	10	..	12,640	.....	.....	.....

*Line used in running 11,573 ft.—7" 30# casing.

At right—when the drilling reached beyond 12,000 ft., the earlier block and hook shown here were replaced with larger units to handle the additional strain of heavier strings and more frequent trips.



by the extremely heavy strings, depth and high temperatures.

With reference to pump upkeep and repair, in drilling to the record depth of 000,000 feet, the Red Devil valves, used in the Ideal and Acme pumps, showed practically no wear, despite the pressure required to handle the drilling fluid.

The two rotary tables used are an H. S. 20½ Ideal high speed, and an Ideal F. E. 27½-inch. The rotary hose had been used in drilling another well to a depth of 8500 feet. This is a Chicksan 40-inch x 45 feet heavy duty steel hose. The hook is a Byron Jackson 300 T Triplet. An Ideal 9-inch spring casing hook, and an Oil Well Supply 150 A swivel are used. The Kelly is a 4½-inch x 40 feet Octagon with 2-inch bore.

(Continued on Page 31)

NOTHING has been subject to more radical change than the mechanics of drilling oil wells. Over a period of relatively few years the record depths have changed from 3,500 ft. to 7,000 ft; then to 10,000 ft. and today the depths exceed 13,000 ft. These DEEP RECORDS have been made possible only by the use of proper tools. New tools made of alloy steels, properly designed and heat treated, to the highest physical property, are the contribution VARCO has made by supplying equipment that meets every condition with ample reserve strength to resist destruction and overcome wear. VARCO tools have always been and will continue to be of the highest standard of quality.

- MASTER BUSHING (RIGID)
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J. A. Campbell

J. A. Campbell, director and member of the executive committee of the California Natural Gasoline Association, ranks as one of the top notch inventors and operators in the industry. Mr. Campbell is vice president of the Lomita Gasoline Corp., for which he built the plant in 1923. Mr. Campbell graduated from Yale in 1915 and early in the following year was helping to lay a line for the Pacific Electric. Less than a year later he went with the Union Oil Co. and soon was placed in charge of the experimental department of the natural gas division of the company. Among the inventions to his credit the Campbell Oil-Froth absorber is probably best known.

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CNGA

February, 1938

This section, a regular monthly feature of the California Oil World, is devoted to the activities of the California Natural Gasoline Association. The California Oil World is the exclusive official publication of the California Natural Gasoline Association, so designated by vote of the Association Executive Committee in a meeting on August 19th, 1937.

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Production Characteristics Of California Flowing Wells

By E. G. Trostel*
At C. N. G. A. February Meeting

To evaluate properly the function of natural gas in the production of oil, it is necessary to consider all the factors which contribute to the behavior of an oil reservoir. It is the purpose of the paper to review these factors, discuss oil well performance, and describe production methods and their relation toward the conservation of reservoir energy. Throughout the discussion, particular attention will be paid to the importance of natural gas as a propulsive force in the movement of oil through the reservoir and as a lifting force in raising the oil from the reservoir to the surface of the ground.

Reservoir Types

Oil reservoirs may be roughly classified according to their geologic structure into open and closed types. In the open type of reservoir the oil is in direct contact with water in the lower parts of the structure, and is often said to be under hydraulic control. The majority of the California major fields as Santa Fe Springs, Signal Hill, Kettleman Hills, Dominguez, and others are of the open type. Closed type reservoirs, as the name indicates, are structurally sealed and are often said to be in volumetric control. The Playa del Rey field is thought to be of the closed type.

Lithologically, reservoirs may be classified as to the pore, fissure, or cavernous type. California fields, producing largely from sandstones and unconsolidated sands are of the pore type. Formations made up of limestone as found in the Mid-Continent area are largely of the fissured or cavernous type.

Reservoirs likewise may be classified as to the nature of the propulsive forces which exist. Reservoirs of the open type are usually controlled by the hydrostatic head of the edgewater and are said to have a water drive. In fields of very high permeability and restricted production the edgewater may follow the withdrawal of the oil so closely that there is very little decline in reservoir

E. G. Trostel

pressure as production takes place. However, in most California fields of the open type reservoir, the permeability is sufficiently low and rate sufficiently high that there is a large pressure differential in the reservoir surrounding producing wells. As a result, it is the expansion of the gas in the reservoir which directly provides the chief propulsive force. In addition, the edgewater encroaches to reduce the areal extent of the oil as depletion takes place, and tends to maintain reservoir pressure.

Gas Expansion

Reservoirs of the closed type are almost entirely dependent upon the expansive action of the gas present to force the oil to the well bore. Capillarity is thought to provide a force for moving the oil through the reservoir, due to the relative adhesion tensions of oil and water. Evaluation of capillary forces is difficult, but in most fields they are thought to be relatively small in comparison with gas expansion and water drive. Due to differences in elevation in an oil structure, gravity likewise acts as a propulsive force for some wells, but usually it is of minor importance.

In addition to the existing reservoir forces, many other factors enter into the ability of a well to produce. Of primary importance are the physical characteristics of the producing sand. Sufficient pore space must be available for commercial accumulation of oil. The porosity of California oil sands varies between wide limits of from ten percent to slightly over forty per cent. Closely connected with porosity in most cases, but not necessarily so, is permeability, an index measuring the ease with which fluids may flow through the sand. Permeability of California producing oil sands varies from slightly over 10 to 1500 or more millidarcys, with the majority of the sands averaging less than 500 millidarcys. The per cent of oil saturation of the pore space is another important factor, having values ranging from 10 to over 50%. It is of interest to note, that practically all productive sands possess up to 50% or more saturation by connate water, held in place by capillary forces and not produced with the oil to any great extent, if at all.

Oil Physical Factor

The nature of the crude oil itself has long been regarded as fundamental among the factors affecting production rate and ultimate economic recovery. The ability of an oil reservoir to produce is inversely proportional to the viscosity of the oil. Surface tension, or rather adhesion tension, affects the amount of oil retained in the reservoir in proportion to its value . Similarly, the ease with which oil flows through the sand varies as some inverse function of its surface tension. The specific gravity of the oil is a factor in that heavy oils tend to be more viscious and to have a higher surface tension.

Before going farther, it is well to consider the effect of gas on the properties of crude oil. Gas in a reservoir will exist in three states, as dissolved gas, as free gas, and as liquefied or condensed gas due to reservoir pressure. The gas in solution and in the liquid state reduces the specific gravity, viscosity, and the surface tension of the resulting crude oil according to the amount of gas present. It is at once evident from these considerations that oil should be produced from a reservoir in such a manner as to keep a maximum amount of gas in solution with the oil. Such procedure will result in lowered production costs and greater ultimate commercial recovery of oil from the reservoir under present methods. In fact, it is a fundamental principle of good production practice to produce the least possible amount of gas with the oil, that is, to produce with the lowest possible gas-oil ratio.

The oil and gas in a reservoir under original conditions are under considerable pressure. This pressure, which in-

*Union Oil Company of California, Los Angeles, California.

creases with depth, may be due to temperature conditions, folding, and the weight of the overlying strata, but is particularly due to the hydrostatic head of the edgewater in California. The original pressure in most California fields has been found roughly equal to the pressure exerted by a column of water equal to the depth of the reservoir, a fact which would be inferred by the open type of reservoir. Regardless of the type of expulsive force controlling the reservoir, the formation pressure must be considered a basic factor, since the flow of oil and gas can be occasioned only by a pressure differential existing between the formation and the well bore.

Control of Production

When a well is placed on production, every effort is made to ultimately produce as much oil as possible for the least cost. Although it is possible to increase permeability in limestone formations by shooting and acid treatment, in California fields, all factors affecting productivity are fixed with the exception of the formation pressure. Excepting recompleting and reconditioning of wells, all control of the many factors affecting the productivity of oil reservoirs and the ultimate economic recovery therefrom turns upon the regulation of the pressure differentials existing between the reservoir and the well bores of the producing wells. In order to understand and control the production of individual wells and the reservoir as a whole, practically all major operators in California measure sub-surface pressures. Analysis of the results of such tests provides the production men with dependable data which aid in selecting the most advantageous methods of production.

Oil Well Performance

In view of the importance of pressure control in production, it might not be amiss to outline the procedure for measuring sub-surface pressures and briefly describe the methods used in denoting well performance.

A sub-surface pressure gauge is lowered into the well and pressures are recorded at various depths. Plotting pressure-depth relations gives rise to curves as illustrated in figures 1 and 2, after Kantzer and Trostel*.

Under static conditions the gauge will record the existing reservoir pressure in the vicinity of the well. The fluid level can be located, the oil-water interface, the density of the fluid, and the effective depth of the hole, insofar as these factors exist. By comparing such data over the reservoir as a whole, and by studying their behavior with time, the trends of gas cap expansion, edgewater encroachment, fluid density, etc., can be determined. When undesirable conditions appear or seem to be imminent, changes in production methods can be made to correct them when their control is possible. The application of depth-pressure curves in producing wells is found in determining the flowing gradients under various conditions. Such data is valuable in studying energy losses in flow strings and in calculating mean formation pressures.

Pressure-Rate Curves

To completely understand the performance characteristics of an oil well, it is desirable to plot the sub-surface pressure opposite the producing formation as a function of the rate of production. Typical pressure-rate curves found in California oil fields are illustrated in Figure 3, after Kantzer and Trostel*. If these curves were strictly linear their use would prove more widespread. However, in perhaps a majority of California flowing wells, the deviation from linearity is not great until a high rate of production is reached which causes the curves to dip toward the axis, possibly as a result of turbulent flow in the formation. By establishing such a pressure-rate curve it is possible to determine with considerable accuracy the pressures which will exist at other rates of flow. Such data constitute a valuable aid to the production foreman or production engineer who regulates the production of the field.

When the pressure-rate curve of a well is substantially linear, it is convenient to speak of the reciprocal value of the slope of the pressure-rate curve. This value, called the productivity index, is equivalent to the gross barrels of oil produced per day per lb. per square inch pressure differential. For example, if an oil well produces 500 B/D with a sub-surface pressure opposite the producing formation of 600 lb. per square inch and 300 B/D with a sub-surface pressure at the same datum of 700 lbs. per square inch, then the well will have a productivity index of (500—300) ÷ (700—600) or 2 barrels per day per lb. per square inch. Productivity indices in California oil fields vary over wide limits, indices being measured of less than 0.1 to as much as 120 barrels per day per lb. per square inch. Productivity indices are useful in evaluating well potentials, and in making comparisons of various wells as to their relative abilities to produce.

Theoretical Potential

By extrapolating a pressure-rate curve to zero pressure, or by multiplying a productivity index by the static pressure, a rate of production results which would

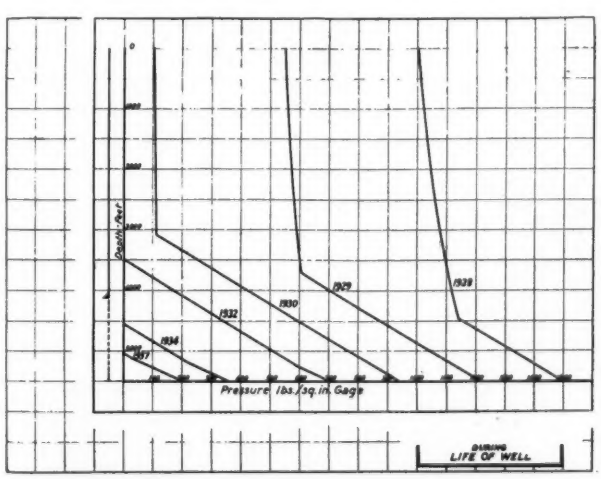


Figure 1. Static Depth-Pressure Traverses.

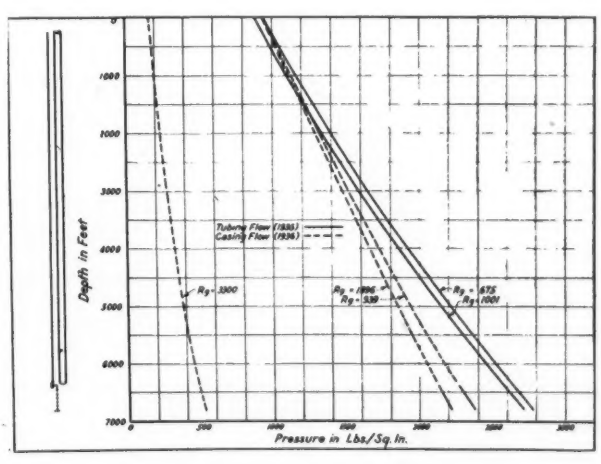


Figure 2. Flowing Depth-Pressure Traverses.

exist if all the oil were removed from the well bore as fast as it came in under zero back-pressure. While such a figure denoting absolute potential can be closely approached only in pumping wells, it may well serve as a theoretical potential for flowing wells and furnish a sound basis for proration. The use of such potentials would obviate the need for open-flow of wells with the consequent danger of damaging the reservoir.

Returning again to consideration of the function of natural gas in the production of oil, it has been seen that in the majority of California oil fields, gas is a chief expulsive force. In addition, it has been noted that the amount of gas in solution with oil increases the fluidity of the oil and the ultimate economic recovery of oil from the reservoir. To attain these desirable objectives, the men in charge of production endeavor to maintain the reservoir pressure at as high a value as is possible under the existing demand for oil, and to produce the oil with a minimum gas-oil ratio. As these two factors are not entirely independent, it becomes necessary at times to strike a favorable balance between the two.

Control of Gas Oil Ratio

Before considering in detail the methods employed to maintain gas-oil ratio at a minimum, it should be of interest to see if the above theoretical conclusions are borne out by experience. Figures 4, 5, and 6 are taken from a paper by March and Robinson*, and they clearly indicate the benefits to be derived from back-pressure control and maintenance of low gas-oil ratios. It is believed that the importance of production under minimum gas-oil ratio has been sufficiently emphasized, and so attention will now be focussed upon methods used in its control.

Tubing Depth

As previously discussed, a well produces solely due to the creation of a pressure differential between the formation and the well bore. At a given time and under the same conditions there is a one to one relation between the oil and gas coming into a well bore and the value of the pressure differential. Since a given quantity of gas accompanies the oil entering the well bore at a given steady production rate, it should not be possible to vary the gas-oil ratio by mechanical flow string devices as sub-surface chokes and tapered tubing strings. However, the depth of the tubing may influence the gas-oil ratio in that it changes the nature of the pressure gradient held against a producing sand of appreciable thickness. Tubing a well low in the producing oil sand as compared to tubing high tends to lessen the pressure differential between the top of the formation and the well bore and to increase the differential at the bottom of the formation. As free gas tends to accumulate at the top of an oil zone, tubing low should decrease gas-oil ratios. Considerable data has been published to illustrate this fact, and although such procedure may not be universally successful, it is a method which definitely warrants attention.

Optimum Production Rate

That gas-oil ratio varies with production rate is a fact which has been observed in practically all California fields. At low production rates and high-sub-surface operating pressures, gas velocities may be sufficiently low in the formation to result in high slippage losses with consequent high gas-oil ratios. As production rate increases and producing pressures are lowered, gas velocities may increase to a point at which friction losses may be the controlling factor accompanied by an excessive loss of gas from solution in the oil. Somewhere between these two extremes a favorable balance should exist, with the gas-oil ratio at a minimum value. Figure 7, after Sullivan*, illustrates such behavior for wells in the Keokuk Pool in Oklahoma.

As a matter of production policy, control of gas-oil ratio usually can be effected by determining the rate of production for minimum gas-oil ratio. It is to be observed that the optimum rate is a transient value, and that the trend of the optimum rate is upward with time. Careful observance of gas-oil ratio vs. production rate characteristics should result in the determination of favorable production rates for any California oil field.

Intermittent Flow

The procedure of intermittent flow or stop-cocking has been suggested as a method for lowering gas-oil ratio. Its success should depend upon a re-distribution of gas in the reservoir resulting in a more uniform saturation of the oil. Field data concerning the effect of stop-cocking on gas-oil ratio are meager and often conflicting; however, the method may be worthy of trial where production requirements permit its use.

**Advantages of Flowing Wells through Tubing*, by H. N. Marsh and B. H. Robinson, A.I. M.E. Production Development and Technology, 1932.

**Gas-oil Ratio Control in Flowing Wells* by R. J. Sullivan, A.P.I. Drilling and Prod. Practice —1937.

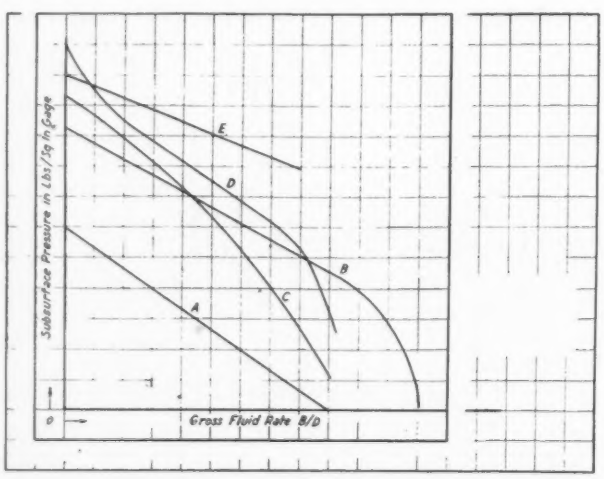


Figure 3. Pressure-Rate Curves.

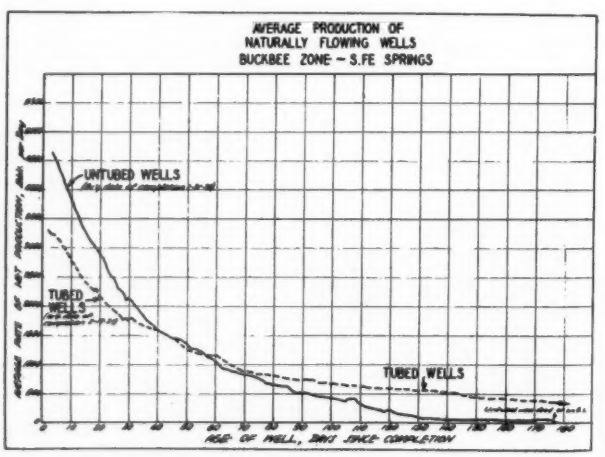


Figure 4. Tubed and untubed well's average Production Characteristics.

ON TIME!

THE VAST organization that is railroading is built around these two vitally important words. Posted on the station bulletin board, they signify fulfillment of the carrier's dual responsibility — to deliver passengers at their destination and to deliver them promptly on split-second schedule.

Our organization, likewise, appreciates their tremendous importance! Going deep to the root of things, we have never permitted ourselves to lose sight of the fact that our client's object in building an absorption plant is to receive a return from the investment it represents at the earliest possible moment. Thus, our acknowledged responsibility becomes not only to engineer soundly, to design correctly and to build solidly, but to finish the job within the time limit specified.

To discharge that responsibility we draw upon the combined resources of knowledge and experience. Waste motion is averted through comprehensive knowledge of the most modern engineering and design practices. Lost time is eliminated through the employment of skilled workmen eager to be up and at it. Delay is avoided by experience in selecting, ordering and routing plant equipment so that arrival for installation is timed well ahead of schedule.

When planning the erection of an absorption plant, let our organization bring to your problem our established reputation for engineering soundly, designing correctly, building solidly and — keeping ever in mind the basic objective behind the decision to build — to complete all these — *"On Time!"*

PARKHILL-WADE
CONSULTING AND
CONSTRUCTION ENGINEERS
973 NORTH MAIN STREET
LOS ANGELES CALIFORNIA

ABSORPTION PLANTS

Surging or Heading Wells

When a well is in the final stages of its flowing life, the nature of flow is usually characterized by a surging or heading action. If the unsteady flow results from a surging reservoir condition, it may be possible to correct this situation and stabilize the producing sub-surface pressure opposite the sand face by mechanical flow means such as tubing packers, sub-surface chokes, tapered flow strings, or by resorting to gas-lift. Such methods can be expected to improve gas-oil ratios only when they affect the pressure differential held against the formation, and not when the oil and gas enter the well bore at a steady rate and with more than enough energy to raise the oil to the surface readily. Here again experimental field data are not consistent, as might be expected, and the limits of application of these methods should be fully understood before their trial as a means of lowering gas-oil ratio.

Gas Exclusion

Many California fields are characterized by the existence of free gas or a gas cap at the top of the producing structure. Wells which are open to the gas zone invariably produce with excessively high gas-oil ratios. These ratios can be materially reduced in most cases by completion or re-completion of wells with blank pipe opposite the free gas, preferably cemented. In line with the above method is that of using a formation packer to exclude free gas from the well. A similar but more complicated method of partial or complete free gas exclusion is being successfully used at Kettleman Hills. A cement "scab" is laid outside the pipe between the free gas and oil "zones." Tubing is packed off opposite the scab job and provided with a flow collar a short distance above the packer. Gas may be admitted above the cement scab through perforations into the casing and then through the adjustable flow collar into the tubing to provide lifting energy for the oil which enters through perforations below the cement scab. This method of control of gas-oil ratio is very effective, since it provides a direct means of regulating the rate of gas entry into the well.

Repressuring and Gas Injection

When the energy of a reservoir has been expended to the extent that production is not profitable, gas injection to repressure the reservoir may be employed provided that the field has not been flooded by edgewater encroachment. Such procedure, a form of secondary recovery, has met with considerable success in materially increasing the ultimate economic recovery of a field. Another method of utilization of extraneous gas is found in gas injection as primary recovery takes place to aid in maintaining reservoir pressure. The flowing life of wells in the field of gas injection is lengthened, and the ultimate economic recovery of the reservoir increased.

Utiliation of Gas in Flow String

The flow of oil and gas up a vertical flow string presents a difficult problem for study. Work must be done to raise the oil and gas to the surface and to overcome the retarding forces of friction and slippage. In the majority of flowing wells this energy is provided by the expansion of the gas associated with the oil.

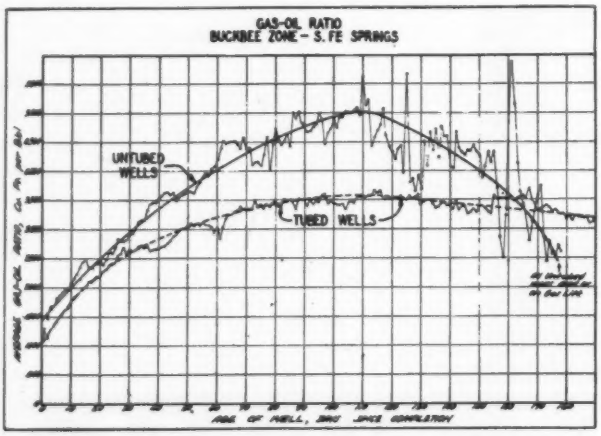
In the early stages of the flowing lives of most California oil wells, more than sufficient energy is present to flow the well. Under these conditions flow losses are relatively unimportant unless use can be made of the energy which the oil and gas possess when they arrive at the surface of the well. When a well reaches the latter stages of its flowing life or goes on gas lift, the efficient use of the gas becomes more important, either to prolong its flowing life or to reduce the input gas to a minimum. To utilize the lifting force of the gas to the utmost extent, sub-surface chokes and carefully designed tubing strings have been used.

Sub-surface chokes are designed to permit the complete expansion of the gas in the tubing. Although they may be quite effective, their use is often overbalanced by the difficulties of their installation and adjustment.

The efficiency of flow through tubing is related to its size. Too small tubing will result in excessive friction, while too large tubing will result in excessive slippage losses. For a given production rate, gas-oil ratio, pressure, temperature, and specific gas and oil, there will be an optimum size of tubing. However, this ideal size will vary over the length of the tubing. The evaluation of the proper taper for a tubing string is exceedingly complex, and can only be approximated at best. In addition, the best tubing string design will change as the production rate declines. As a result of all the difficulties involved, tubing design generally ends in the selection of a uniform string of standard size.

Conclusion

In reviewing the characteristics of oil and gas reservoirs, it has been seen that



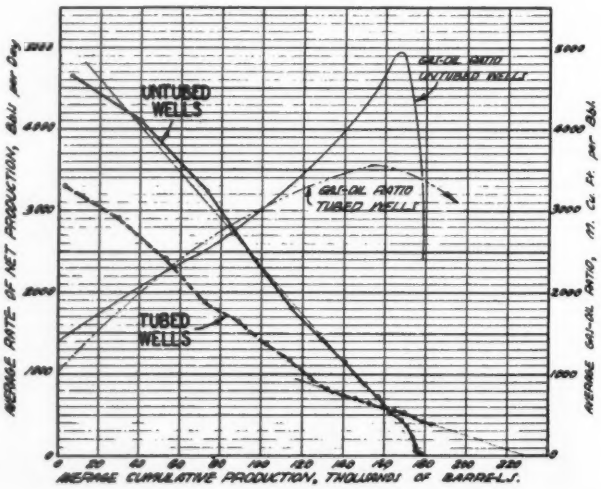
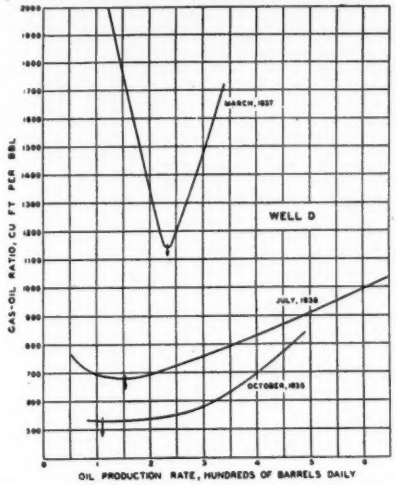


Figure 5. All flowing wells having individual meters. Figure 6, right, rate-cumulative production curves for naturally flowing wells in Buckbee Zone. (Same information as Figure 4 on a cumulative basis with G-O ratio curves from Figure 5.

natural gas provides a chief expulsive force in driving the oil out of sand to well bore and finally to the surface of the ground. Good production practice hinges about keeping a maximum amount of this gas in the reservoir as withdrawal takes place, thus keeping production costs at a minimum and economic recovery at a maximum. The most important means of maintaining a low gas-



Fgure 7. Gas-Oil Ratio characteristics of Keokuk wells.

oil ratio are found in positive exclusion of free gas, producing at an optimum rate, and tubing wells deep. Recovery from an oil reservoir is usually increased materially by gas injection and repressuring by gas. To effect proper utilization of gas energy in lifting the oil to the surface, the flow string should be selected to minimize friction and slippage losses. These requirements usually can be met by a uniform tubing string of standard size.

Texaco Promotes Howard Cole Jr.

Howard S. Cole Jr., production executive for Texaco on the Pacific Coast, has been appointed assistant manager of the West Texas division of the company's production department, according to a statement made by C. E. Olmsted, president of The Texas Co. of California.

Mr. Cole joined Texaco on the Pacific Coast as research engineer in 1926 and was promoted to assistant general superintendent of production and drilling in 1929. He was appointed general superintendent in 1934.

Cole's post will take him to Fort Worth, Texas where he will take over his new duties. R. L. Keyes, drilling superintendent of Texaco's Pacific Coast operations, succeeds Mr. Cole.

Richfield Outlines 1938 Developments

Having completed major adjustments concomitant with its reorganization, Richfield Oil Corp., during the past few months, has laid the groundwork for an extensive production development program to be executed during the ensuing year.

Considerable work already has been done along this line and the 1938 budget provides for an accelerated rate of production development. It is estimated that the company will spend from $2,500,000 to $3,000,000 for the acquisition of additional production during the present calendar year.

With over 600 new men added to its production department, Richfield today has ten drilling crews in the field as compared with only one a year ago. Of the ten wells now being drilled, two are test wells and the other eight are located in proven territory.

The wells currently being drilled in proven areas include two in the Long Beach extension of the Wilmington field, two at Long Beach, one at Belridge, one at Elk Hills, two at El Segundo and one at Rincon. Tentative plans call for the drilling of 60 or more additional wells on proven property during 1938.

New wells completed since reorganization of Richfield on March 13, 1937, have increased the company's production from 17,000 barrels daily to 20,000 barrels daily at the present time.

However, this comparison does not show the correct relative importance of new production. Due to the normal decline in output from old wells, Richfield's current production, had no new wells been drilled, would be only approximately 13,000 barrels daily. This indicates that additional production obtained by the new company since last March totals around 7000 or an increase of over 53%.

During the past few months Richfield has been exceptionally active in its search for proven and prospective oil land. This activity is reflected by a material increase in the properties held by the company.

Total property now owned, in fee or leased, amounts to something over 100,000 acres. This compares with 51,788 acres as of March 13 last, an increase of approximately 100%.

Union Oil Co. Adds Huge Oil Tankship

Union Oil Co. has placed an order for a new oil tankship, to be the largest and fastest in its entire fleet, with the Bethlehem Shipbuilding Corp., Ltd., according to an announcement by W. L. Stewart, Jr., vice-president of the oil company.

The new tanker will be built at Bethlehem's Sparrows Point plant, near Baltimore. Delivery of the vessel is scheduled to take place in about 12 months. A. O. Pegg, Union's superintending engineer, will leave for Baltimore Saturday evening to supervise construction of the vessel.

Union's new tanker will augment the oil company's domestic fleet, consisting at present of ten capital ships. It will be the first major addition to Union's fleet since 1922.

The new tanker will be of 13,000 tons deadweight and will have a capacity of over 100,000 barrels of oil. Sea speed will be twelve and one-half knots. Overall length will be 463 feet, with a beam of 64 feet and a depth of 34 feet, 10 inches. The tanker will have a draught of 28 feet, 4 inches.

Bulletin Compares California Crude Oils

That the crude oils produced in the state of California have a wide range of physical and chemical properties is illustrated anew in a recent report by the Bureau of Mines, U. S. Department of the Interior, giving anaylses of 16 samples of crude petroleum from ten fields of the state. The samples range in gravity from 15.9 to 61.8 degrees A.P.I.; in sulphur content from less than one-tenth of 1% to 2.7%; and in total gasoline and naphtha content from less than 1% to more than 90%. Contrary to a prevalent opinion that petroleum produced in California does not contain paraffin wax, the analyses indicate that ten of the 16 samples contain appreciable quantities of wax; the remaining six samples apparently are wax-free.

Bureau of Mines Report of Investigations 3362, Properties of California Crude Oils: V-Additional Analyses, by E. C. Lane and E. L. Garton, may be obtained upon request, without charge, from the Information Division, Bureau of Mines, Washington, D. C.

Speed—but under control—that's electrical power for drilling jobs! And it is economical, verra!

Here is a fresh sample, the old standbys, "A" and "B" again. Two wells drilling on neighboring leases in the Long Beach area—"A" used electricity and "B" another source of power. Both went to approximately the same depth. "B" was spudded in December 5 and completed January 22. "A's" rig was spudded in fifteen days later, on December 20, and was completed the same time as "B"—on January 22.

The cost of the electric job was $300—$9.38 per day or 7½ cents per foot of hole drilled.

Draw your own moral from this story—then call Edison Company for free consultation with its oil field electrical engineers on **your** power problems.

SOUTHERN CALIFORNIA Edison EDISON COMPANY LTD.

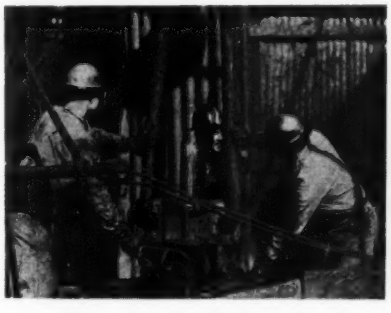
2-38

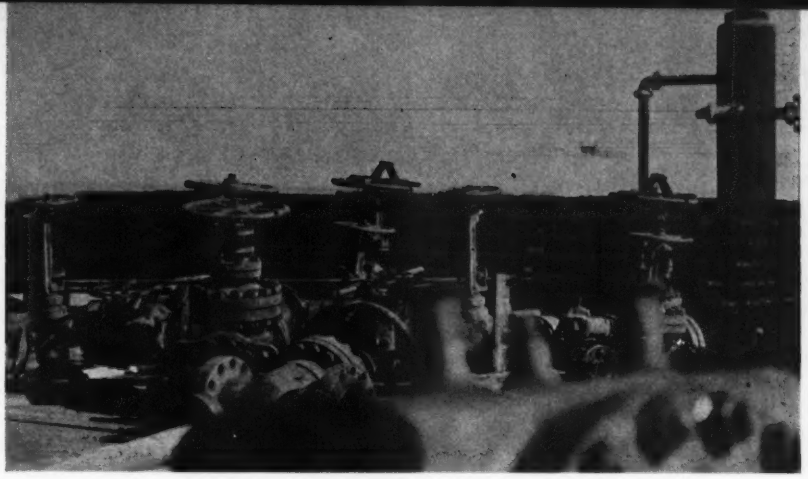
(Continued from Page 22)

From 5512 feet to 11,584 feet the drill pipe was 4½-inch, 16-pound National internal flush, external upset, Grade D (30-foot lengths), with Reed 4½-inch shrink grip internal flush tool joints. From 11,584 feet to the present depth, Youngstown 3½-inch, 16-pound internal flush, external upset, Grade D, with Hydril joint is used. Chabelco Rex and Chabelco Champion rotary chain, and an American 1⅛-inch wire line have given outstanding service. The men in charge of the drilling are frank in saying that replacement of the old drum in use on the well would have given the wire line a remarkable record. The bits used were principally Hughes and Reed bits.

The Reed wire line core barrel with 8½-in. hard formation head was used to core with intermittently from 9500 ft. to 11,576 ft., taking a total of 69 cores. At approximately 11,580 ft. Continental installed a safety joint in the drill stem, with an inside diameter of 1⅞-in. and as this diameter was too small to allow dropping a core barrel through, it was necessary to use the conventional method of coring from that point. After coring procedure was changed, a Reed Model "B" hard formation conventional core barrel was used in 6-in. and 5⅞-in. sizes. One of the Reed 6-in., Model "B" conventional core barrels was run from 12,786 ft. to 12,798 ft., recovering the full 12 feet dug and it was this run that broke the world's depth record. The Gulf well No. 103 McElroy held the record up to this time with a depth of 12,786 ft.

"The job could not have been done





CONTINENTAL'S KCL-A-2

WORLD'S DEEPEST OIL WELL

THE 14TH CONSECUTIVE WORLD'S RECORD WELL

drilled with

MARTIN-DECKER INSTRUMENTS

A RECORD THAT SPEAKS FOR ITSELF!

As the never-ceasing search for oil goes deeper and deeper, precision drilling control methods become an absolute necessity. The men drilling Continental's deep well say they "could not have done without the Martin-Decker Quintuplex Weight Indicator."

Today Martin-Decker engineers are perfecting the control instruments that will guide tomorrow's **20,000** foot wells!

DO YOU KNOW?

The world's highest oil field at Lake Titicaca, Peru, is as far above sea level as Continental's K. C. L. A-2 is below the earth's surface.

THE WEIGHT INDICATOR

MARTIN-DECKER CORPORATION

LONG BEACH CALIFORNIA

San Joaquin Valley: A. F. McQUISTON, Bakersfield, California

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BIT RECORD—K.C.L.-A2
(Bits used from surface to 11,584 ft.)

Type No.	Size	No. Used	Total Footage	Total Hours	Drilling Speed Ft. Per Hr.	Av. Ft. Per Bit	Total Core Recovery	Percent Recov.
1	20½	1	497	10	49.7	497		
2	14¾	1	221	4	55.3	221		
1	14¾	10	4787	200	23.9	478.7		
1	9⅝	1	29	4	7.3	29		
3	9⅝	4	1375	100	13.75	343.7		
4	9⅝	6	1061	202	5.3	176.9		
5	9⅝	29	2771	904	3.1	95.6		
			WIRE LINE CORES					
6	9⅝	2–28	289	...	.....	144.5	262	90.6
7	3½	14–67	554	...	.....	39.5	341	61.5
			BIT USED FROM 11,584 ft. TO 13,312 ft.					
8	6″	3	15	15	1.0	5	Junk Trap	
5	6″	27	1125	327	3.8	47.9		
9	6″	35	544	...	.....	15.6	381.5	81.3
10	6″	3	32	...	.....	10.7	20.0	65.6

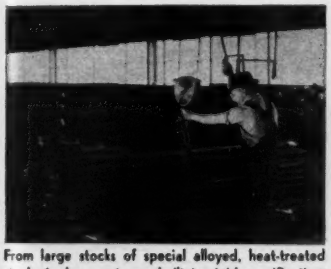
Total bits used from 0 — 13,312 ..... 82*
Total core heads and core bits 0 — 13,312 55
*Include one bit and two junk traps.

without it," is what the engineers say about the Martin-Decker weight indicator. Most of the credit for keeping the hole under the derrick floor is given to this instrument and to its intelligent use. Handling the 101-pound mud are two McNeely vibrating Model D4 mud screens. As the well deepened below 12,000 ft. the drilling mud was made lighter until it almost reached the consistency of water. On the job also are a Regan Type K blowout preventer, and a Merco Nordstrom full opening valve used for complete shutoff. The Nordstrom lubricated plug valves are used on the suction, discharge, bleeder and standpipe lines of the drilling-mud manifolding.

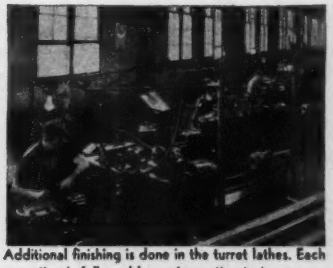
LOOK at LIFE
in the oil well equipment industry–*thru the eye of Axelson's candid camera*

Axelson Deep Well Plunger Pumps are operating efficiently and economically in oil wells the world over. One of the important factors of plunger pump operation is the ball valves. This series of candid camera shots shows steps in the production of Axelson seats and balls, the care and precision with which they are made.

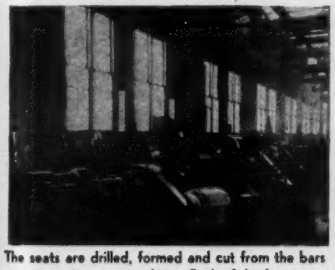
Alert oil men will recognize the outstanding features of Axelson production methods which make Axelson seats and balls as nearly perfect operating a ball valve as is possible to build in the world today.



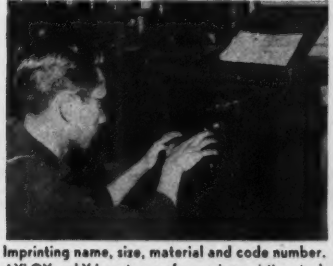
From large stocks of special alloyed, heat-treated steels Axelson seats are built to rigid specification. Samples from each bar are tested and inspected in the laboratory before they are accepted. Any deviation from Axelson standard means rejection.



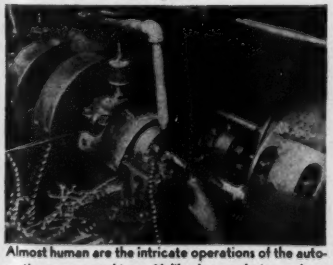
Additional finishing is done in the turret lathes. Each operation is followed by an inspection to insure precision and uniformity. Improper machining results in rejection at any point during the process of manufacture. Care at every step assures few rejections.



The seats are drilled, formed and cut from the bars on automatic screw machines. Each of the four types of Axelson seats starts its manufacturing operations in this way. The uniform high quality of Axelson products is the result of constant vigilance.



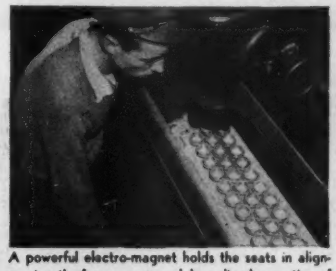
Imprinting name, size, material and code number. AXLOY and X-L seats are of corrosion-resisting steel. DURAX and ACME seats are of specially selected steel properly heat-treated for long life. Axelson builds ball valves to meet every well condition.



Almost human are the intricate operations of the automatic screw machines. Unlike human beings, these machines do not vary, once they have been set. Every seat is uniformly cut. Each one looks like the next, but all must pass individual tests.

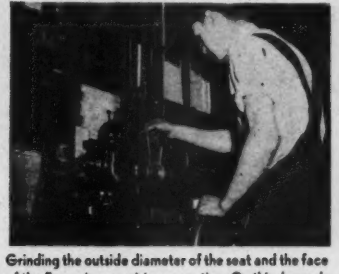
Automatic control of the heat-treating furnaces makes possible production of seats of uniform hardness. Each seat is tested before and after heating to make sure it meets specification. Here Axelson seats get hardened for a long life in a deep well plunger pump.

The final inspection of Axelson seats and balls is made by Andrew Andris, who has been making and testing balls and seats in the Axelson plant for more than 18 years. The skill and experience of Axelson employees are important factors in the production of pumping equipment. Axelson's reputation in the oil industry today is built on unceasing efforts to build a better product.



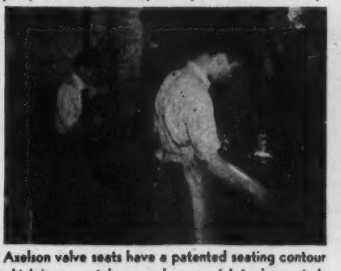
A powerful electro-magnet holds the seats in alignment as the faces are ground. Long-lived operation of Axelson seats and balls is due largely to the extreme care with which all machine operations are performed. Axelson has built oil equipment for 45 years.

Perfect contact between each seat and ball is accomplished by lapping in patented machines designed and built by Axelson for this operation. It is here that Axelson balls and seats become partners for greater pumping production.

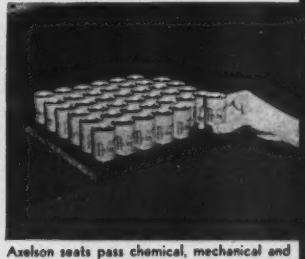


Grinding the outside diameter of the seat and the face of the flange is a precision operation. On this depends the accurate centering of the seat in the valve, a matter of vital importance in the efficient operation of the pump. Axelson accuracy is a by-word in the industry.

The seal between both sides of each seat and its ball must be perfect. Here we see seats and balls being tested. The ball and seat must hold a high degree of vacuum over a period of time and must not leak.



Axelson valve seats have a patented seating contour which is accurately ground on special Axelson grinding machines by skilled workmen. This patented Axelson seating contour means better valve operation for a longer time under any well conditions.



Axelson seats pass chemical, mechanical and metallurgical tests. These tests assure the operator of a ball valve which will give maximum service in the well. Axelson AXLOY balls and seats are ready for a long and productive life.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON

DEEP WELL PLUNGER PUMPS

SUCKER RODS

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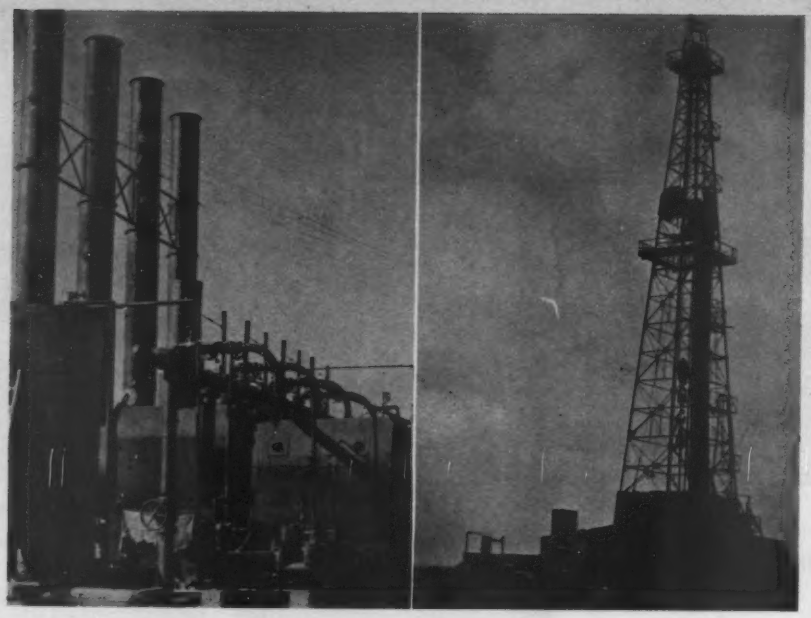
Mid-Continent and Eastern Distributor: Frick-Reid Supply Corporation • *Rocky Mountain Distributor:* Great Northern Tool & Supply Company.



These are 2-inch, 3-inch and 4-inch valves, mostly of the flanged type. The majority of the valves on the mudlines are the Hyperseal type. The drilling through valve on this well is a 7-inch round opening Hyperseal, Series 1500, and the well is the sixth drilled with this particular valve. The round opening permits insertion of 8⅝-inch casing and tools.

As a safety factor, a Regan Type K Blowout Preventer was installed in the cellar above the round-opening Hypreseal drilling-through valve. This blowout preventer embodies a flexible rubber packing which permits tight clamping around the drill pipe when desired. The pipe can be run in or removed against pressure.

A Regan Santa Fe Casing Head with a landing base is part of the well's equipment.

In casing the well National seamless 16-inch, 65-pound casing was used to 497 feet. National 10¾-inch, 58.8-pound seamless, Grade D, was used to 5512 feet, and Spang streamline, 7-inch, 30-pound, Grade D, to 11,573 feet.

A Baker Regular Cement Whirler Float Shoe used in conjunction with a Baker Regular Cement Float Collar were used to safely guide, float and cement this record string of casing.

Accompanying this article is a table showing bit records. The numerals at the left refer to the following: 1, Dunlap Four-Way; 2, Byron Jackson Disc; 3, Reed Rock bit; 4, Chicago Pneumatic Rock bit; 5, Hughes Rock bit; 6, Elliott Wire Line Drag Head bit (for soft formation); 7, Reed Wire Line hard formation type bit; 8, two junk traps and Zublin bit used while fishing; 9, Hughes Hard Rock core barrel; 10, Reed Hard Rock core barrel.

The following table of equipment used in drilling the world's deepest well is given for more convenient reference:

1—34-26 Ideal 4 Speed Unitized

WORLD'S DEEPEST WELL
-CONTINENTAL OIL COMPANY'S KCL A-2

A. H. BELL, General Superintendent

Greatest credit is due the personnel of Continental Oil Company for drilling the deepest well in the world's history.

We are gratified that BAROID PRODUCTS were used in this well—as they have been used in most of the deep wells drilled throughout the world.

BAROID PRODUCTS

BAROID—Extra Heavy Drilling Mud. AQUAGEL—Trouble-Proof Colloidal Drilling Mud. STABILITE—an Improved Chemical Mud Thinner. BAROCO—an Economical, Salt-Water Resisting Drilling Clay. FIBROTEX—For Preventing or Regaining Lost Circulation in Drilling Wells.

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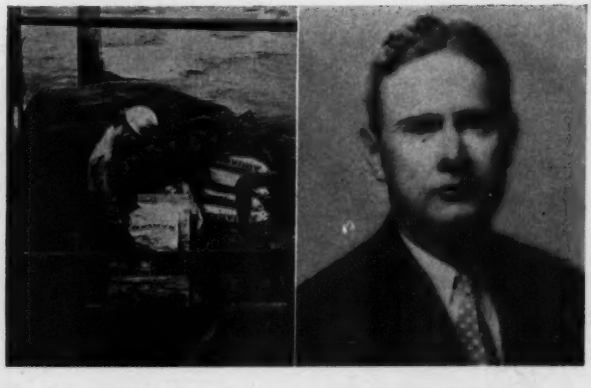


DICK FRENCH, Mud Engineer

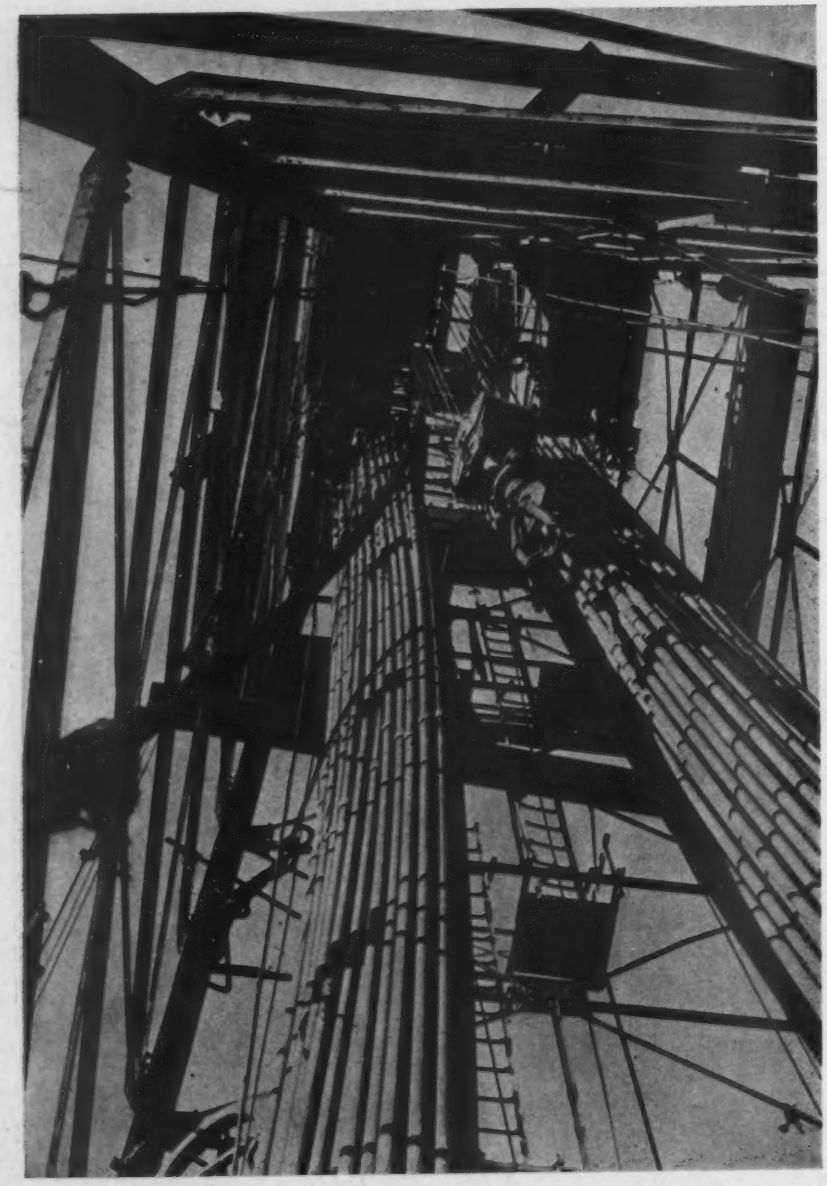
In Car, Lou Hopkins, District Tool Pusher
Standing, Jim Craig, Tool Pusher

BAROID SALES DEPARTMENT

NATIONAL PIGMENTS & CHEMICAL DIVISION OF
NATIONAL LEAD COMPANY
BAROID SALES OFFICES • LOS ANGELES • TULSA • HOUSTON

Efficiency of the Crews Averted Troubles.

F. W. Banks, D. W. Benson, J. T. Campbell—driller, E. E. Barber, W. W. Gilchrist, J. T. Grogan. L. M. Warden, driller, A. E. Norton, C. D. Patton, B. N. Hornell, B. L. Smith, R. D. Packard The keen interest of the drilling crews accounts for the freedom from mishaps.



Draw Works with 36-inch roller bearing Hydromatic Brake;
1—12-inch x 12-inch Ideal Ajax Twin Cylinder Roller Bearing Steam Drilling Engine;
1—Hopper Type SS Two-Drum, 4 Speed, Standby Hoist with 25/55 H. P. motor;
1—Regan Type B Double Deck Crown Block;
1—14½x7½x18-inch Ideal Steam Slush Pump;
2—14x7¼x16-inch Acme Steam Slush Pumps;
4—100 H.P., 250-pound Titusville Iron Works Boilers; ;
1—Foster Wheeler Portable Oilfield Superheater;
1—Emsco Type A-94-50-inch 5 Sheave Traveling Block;
1—Byron Jackson 300 T Triplex Hook;
1—Ideal 9-inch Spring Casing Hook;
1—Oil Well Supply 150 A Swivel;
1—H.S. 20½-inch Ideal High Speed Rotary Machine;
1—Ideal F.E. 27½-inch Rotary Machine;
2—McNeely Vibrating Mud Screens, Model D 4;
1—Regan Type K Blowout Preventer;
1—Merco Nordstrom Full Opening Valve (for complete shutoff);
1—4¼-inch x 40-feet Octagon Kelly with 2-inch bore;
1—4-inch x 45-feet Chicksan Heavy Duty Steel Rotary Hose;

IDECO

Continental Oil

COMPANY'S K.C.L. A-2
at Wasco, California,

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DEEPEST WELL
has an
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INTERNATIONAL DERRICK AND EQUIPMENT COMPANY
of California

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On the WORLD'S DEEPEST WELL *Red Devil* SLUSH PUMP VALVES SHOWED PRACTICALLY NO WEAR!

Enormous pressure and hundreds of hours of operation have produced practically no wear on the RED DEVIL Valves used in the two Slush Pumps on Continental Oil Company's KCL A-2.

RED DEVIL Slush Pump Valves *last longer, seal tighter* and *assure maximum results at lowest upkeep cost.* Reasons for their superior performance are described in Bulletin 107. Ask for it—or see page 1540 in the Composite Catalog.

RED DEVIL PRODUCTS

For Slush Pumps—

Valves • Valve Seat Pullers • Tapered Rod Piston Pullers • Piston Rods (Dia-Hard Steel) Pump Mfgrs. Type • Piston Rods (Dia-Hard Steel) Universal Type • Liners (Dia-Hard Steel) • Liner Pullers • Floating Type Piston Rod Stuffing Boxes (Self adjusting)

•

All-Steel Rotary Hose Stand Pipe Outlets

•

Steel and Rubber Rotary Hose Connections

•

Connections for Stand Pipes, Rotary Swivel Goosenecks, Rotary Hose, Pump Manifolds

•

Floating Type Eccentrics for Drilling Engines

Literature available or see Composite Catalog

OIL WELL *Manufacturing* CORP.

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L. J. Hopkins, tool pusher; John Grier, drilling foreman; J. C. Craig, asst. tool pusher.

1—Ideco 122-ft. Galvanized Steel A.P.I. Drilling Derrick, 30-ft. A window, 465,000-pound capacity with 6-ft. extension.

The rotary chain was Cabelco Rex on 1030, and Cabelco Champion on 1240. The American wire line used was 1⅛-inch of lang and right lay.

Among the records broken on this well was that for electrical logging of formations far below levels previously attempted. The Geoanalyzer Corp. surveyed 1300 feet at 12,879 feet, going in, recording, studying progress, and coming out of the hole all in two hours.

The running of 11,572 feet of 30-pound, 7-inch, Spang "Extreme Line" casing in eight and a half hours, with a high run of 1790 feet in one hour, is another record for the deep zone wildcatters to shoot at.

In viewing the accomplishment of continental Oil Ci. in drilling a wildcat well 10,000 feet deeper than any previous test, it may be interesting to note here what was said upon the completion of Gulf Production Co.'s McElroy 103, deep well record holder before Continental's K.C.L. A-2. The McElroy well was drilled to a depth 1409 greater than any well before the middle of 1935. The entire year of 1934 was spent in drilling 2400 feet in the hard formation between 8600 and 11,000 feet in the McElroy well.

Paul Elder, Jim Webb—driller, R. Horton, C. Leffler, "Slim" Taylor.

REGAN EQUIPMENT

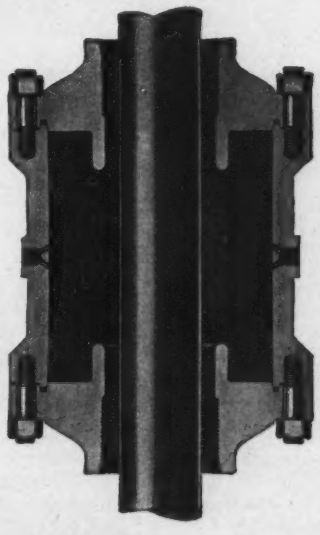
contributes to drilling

WORLD'S DEEPEST WELL

In congratulating the personnel of Continental Oil Company responsible for achieving the World's record depth in oil well drilling, it is with pardonable pride that we point to the Regan Equipment which played a part in making this possible.

The Regan 6-Sheave Type B Crown Block had already seen service on other wells before being used on K.C.L. A-2. This Block, originally designed for 200 tons safe load capacity, speaks well for the materials and workmanship built into it to provide the strength and factor of safety necessary to assure such performance. No replacements were necessary.

The Regan Type K Blowout Preventer, provided a means of instantaneous closure around pipe or kelly in the event of a threatened blowout, while the Santa Fe Casing Head provided a safe and economic means of suspending and tying the several strings of casing together.



Ask for Bulletin or see Composite Catalog.

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Field Development

Los Angeles Basin

L. B. Harbor Wells Consistently Large

Reminiscent of Santa Fe Springs in its heyday is the consistency with which large wells are completed in the Terminal zones in the newly developed Long Beach extension of the Wilmington field.

Hancock Oil Co. Harbor A-1 was bottomed at 3900 ft. and completed with a full oil string landed on bottom and perforated in the Ranger from 2350 to 2678 ft. and in the lower zones from 2876 to 3900 ft. 3-inch tubing was run to 3814 ft. and a packer set at 2688 ft., thus allowing the Ranger to flow through the casing and the Terminal zones to flow together through the tubing. Combined production has built up from 3800 bbls. to 4100 bbls. with the gravity slightly over 26 degrees and the cut under 1.0%.

Cedarholm No. 1 of the Long Beach Harbor Oil Co. contributed another 4000 bbls. when completed from the Terminal zones only. With total depth at 3805 ft., 1359 ft. of 8⅝-in. casing containing perforations opposite the Upper Terminal from 2850 to 3325 ft. and in the lower horizon from 3365 to the shoe at 3796 ft. was run and cemented through perforations at 2850 and 3365 ft. In this manner the Ranger was cased off and between the Terminal zones a barrier was placed in which to set the tubing packer to allow controlled production of each zone individually.

Producing better than 2400 bbls., General Petroleum Corp. completed Harbor Comm. No. 7 from a total depth of 3900 ft. In order to flow each horizon separately a combination string of 8⅝-in and 6⅝-in casing was landed at 3892 ft. and the blank section between the Ranger and Terminal zones cemented at 2820 ft. Perforated intervals are from 2410 to 2690 ft., 2820 to 3300 ft., 3340 to 3590 ft. and 3630 ft. A 6⅝-in. flow string was landed on the swedge joining the different diameters of oil string at 2790, enabling the Ranger zone to flow between strings while the upper Terminal flows through the 6⅝-in. oil string around the tubing and the lower Terminal flows through the tubing, the separation being accomplished by means of a tubing packer set in the blank section between the zones.

Harbor Comm. No. 1, brought in in the same manner last month and later found to have casing bad, has been recompleted after running a 4¾-in. protective string to 3365 ft. The well is now flowing 560 bbls. of clean oil.

On the Long Beach side of the line near the Ford plant, Union Pacific Railroad completed one of the largest Ranger zone wells on record when No. 46 came in flowing 1172 bbls. of clean oil. The gravity, which is 23.5, compares favorably with that found in the upper Terminal zone. The 8⅝-in. casing was cemented at 2642 ft. and the 6⅝-in. perforated liner landed on bottom at 2850 ft.

Operating on the Backbay Tract, Superior Oil Co. and A. T. Jergins brought in Nos. 1, 5 and 14 from the Ranger. No. 1 was bottomed at 2940 ft. and brought in from 483 ft. of oil sand, producing initially 446 bbls. through a 22/64-in. bean. No. 5 set pipe and bottomed at identical depths with No. 1 and was completed with initial production very nearly the same, 470 bbls., using a similar bean. Located on the bank of the Flood Control channel by the Broadway bridge, No. 14 cored the zone somewhat lower, setting water string at 2642 ft. and completing from 3018 ft. flowing 120 bbls. of clean oil.

Whipstocking the hole from beneath its surface location on the Breslin property to a point under the Proctor & Gamble soap factory, Richfield Oil Co. obtained a 152 bbl. yield from P & G No. 2. A 309 ft. interval is open to bottom at 3122 ft.

From a depth of 3050 ft. Caminol Co. Ltd. brought in Harbor No. 1-6 flowing 400 bbls. a day of 17 gravity oil cutting less than 1.0%.

Other recent Ranger completions are General Petroleum's Blinn No. 2 on the north side, with a 200 bbl. flow from 3270 ft., Harbor Comm. No. 2 at Santa Clara and Broadway for 425 bbls. from 2992 ft., and Richfield's Star Drilling No. 1 pumping 165 bbls. from 3300 ft.

Prospecting for deeper production in the Broadway and Mitchell sector, Richfield Oil Co. is coring Guernsey No. 1 below 5110 ft., no oil sand having been recovered beneath the Ranger zone.

Barnsdall's O'Dea 19 Shows 1068-bbl. Initial

Completing its second big well from the seventh Miocene O'Dea zone in the Athens-Rosecrans field, Barnsdall Oil Co. obtained an initial flow of 1068 bbls. of 33.6 gravity oil cutting 1.6% in O'Dea No. 19. With the same bean, 43/64-in., second full 24 hours production built up to 1280 bbls. of clean oil and 900,000 cu. ft. of gas with pressure of 460 lbs. on the tubing and 1350 lbs. on the casing. The 8⅝-in. water string was cemented at 7243 ft. and a 5¾-in. liner including 355 ft. of perforation was landed on bottom at 7600 ft.

Continuing with its deep development program, Barnsdall has moved shop buildings and spudded O'Dea No. 20 200 ft. north and 975 ft. east of the intersection of Rosecrans and Broadway.

Second Newhall Test Is Flowing 1660 bbls.

Far overshadowing the discovery well, Rancho San Francisco No. 1, Barnsdall Oil Co. brought in its second well on the Newhall Anticline flowing 1660 bbls. of 33.0 gravity clean oil and over 1,000,000 cu. ft. of wet gas.

Promptly beaned back with a 25/64-in. orifice after the initial gauge, the well flows 615 bbls. with 175 lbs. tubing pressure and 800 lbs. casing pressure together with 600,000 cu. ft. of gas, a vastly more favorable ratio than No. 1 which made 1,800,000 cu. ft. with only 250 bbls. on its first test.

Although much oil sand of fair quality was cored below 5975 ft., formation tests indicated only small production possibilities and 7-in. casing was carried to 6370 ft., leaving 242 ft. of good oil sand, streaked with shale open to bottom at 6712 ft. The hole was mechanically completed by landing 357 ft. of 5¾-in. liner including 336 ft. of perforations.

Located in sec. 26, 4-17 approximately 1500 ft. southeast from No. 1, No. 2 according to micro-paleontological data is only 27 ft. higher structurally, and after running an electrical log was discovered to have passed through three possibly productive sands above the horizon now open. As this sand is Modelo (upper Miocene) and is approximately 1400 ft. higher in the geologic section than the middle Miocene production found in Pico Canyon, and as there is every reason to expect the presence of Temblor sands, it appears probable that at least two potential oil zones exist below the "San Francisco" horizon. Preparations are being made to drill a third well 660 ft. west of No. 2 in which formation tests will be made of all upper showings not tested by the first wells.

El Segundo Work On Down Grade

El Segundo activity is now at the lowest ebb in more than a year with only six wells working at the present time and no new ones started since the first of January. The dearth of new projects is attributed to the fact that the proven area is fairly well defined and with but few exceptions, recent completions have been too small to justify 7500 ft. drilling. Even those wells with large flush production have declined with undue rapidity.

In the northwest townlot area Sovereign Oil Co. is drilling at the shallowest depth of any well in the field, 6050 ft., while Apex Pet. is completing Converse No. 1 from 7410 ft. The schist was topped at 7000 ft. and the water string set at 6975 ft. Termo Co. Elsie No. 2 is preparing to set casing after encountering the basement at 7250 ft. At the north edge of production, Ohio Oil Co. Gough No. 11 cored into the conglomerate at 7293 ft. and is drilling in schist below 7370 ft. Standard Oil Co., after cementing 7-in. casing over the oil zone at 7042 ft., is coring Refinery No. 8 ahead below 7200 ft.

Last hopes for continued drilling activity are dying with the poor showing made by Wilshire Oil's western outpost, El Segundo Construction Co. No. 1, now in shale below 7400 ft.

Three wells have been brought in on the beam, the largest being Standard's Refinery No. 7 with 205 ft. of open hole to bottom at 7330 ft. Oil production is running better than 450 bbls. with about 15 bbls. of water per day. Wilshire Oil Co. has Elsie No. 2-1 and Security No. 2 "bobbing" with recovery averaging 275 bbls of clean oil per well.

Brea Canyon Oil Co. has spudded well No. 48, its first drilling venture in the old field in some time.

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3. CONVINCE yourself, by measuring their longer life and continued efficiency against any other plug valve on the market, that MacClatchie "Hydro-Seal" Plug Valves give superior performance at a definite saving!

Hundreds of progressive operators in all parts of the world have made this showdown test, and have adopted MacClatchie 'Hydro-Seals" for their plug valve requirements. They'll sell themselves to you, too.

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COMPTON, CALIF. HOUSTON, TEXAS

EXPORT: GEO. R. WOODS, 17 BATTERY PL., NEW YORK CITY

Geology Favors New Carmenita Test

A test for oil has been started in the L. A. Basin about 3 miles southeast of Santa Fe Springs at Carmenita. The geological work was done by Ralph Arnold; J. M. Battersby representing San Francisco and Eastern capital is making the test.

This area has long been looked upon by geologists and oil men as a potential oil field. The dome covers about 1100 acres in parts of sections 20, 21, 22, 27 and 28, T. 3S., R. 11W. The topography in the immediate vicinity is comparatively flat, except for a slight bulge on the surface which is believed to mark the crest of the dome. The principal surface evidence consists in the diversion of the west branch of Coyote Creek where it strikes the bulge and turns and flows southeast for nearly one and one-half miles at right angles to the normal flow of the streams in the part of the L. A. Basin, as shown in the U. S. G. S. topographic map, surveyed in 1902. Several wells have been drilled in this area.

The Petroleum Midway and the Petroleum Center wells drilled some years ago are believed to show an edge indication to the south and west of the present location, which is in the south half of the northwest quarter of the southwest quarter of section 21. The first sand is looked for between 4,000 and 5,000 feet. Gilmore, Getty, Western Plains and the Carmenita Oil companies are interested in this area.

Tideland Survey System Is Approved

Methods of engineering science in computing California's tideland boundary lines were affirmed on February 15 in a decision at Sacramento by the Third District Court of Appeal. The court, in approving methods of computing high tides, affirmed a judgment of the Orange County Superior Court which set aside tidelands ownership according to these computations. The method commonly used is that employed by the Federal Coast Geodetic Survey to check vertical rises of the tide.

Last Rites For J. H. Connolly

Funeral services for J. H. "Jack" Connolly, partner in Connolly & Van Denburgh, Los Angeles, who died Feb. 12, were conducted from Immaculate Heart church in Los Angeles, Feb. 14.

Chemistry Increases Crude Oil Production

Chemists are the great wonder workers of modern times. They make gases, liquids and solids behave exactly as they want them to. They get more than a gallon of gasoline out of a gallon of oil. They get chlorine gas out of salt; add hydrogen and dissolve the two gases in water to make hydrochloric acid. They pour the acid down an oil well to eat out limestone formations and increase the flow of oil. They know what to add to the acid to keep it from eating up the drill pipe and bit. They have invented a "Jelly Seal" to plug off water in a hole. It mixes with water and soldifies, and permits the acid treatment to take effect at a given depth. After twenty-four hours the "Jelly Seal" turns into liquid again under the action of a certain kind of bacteria with which it is inoculated. Then it can be bailed out with the spent acid.

Within the past five years remarkable results have been obtained by acid treatment of oil and gas wells. Old wells that have been on the pump have been brought in as flowing wells with multiplied production. Gas/oil and water/oil ratios have been controlled. Careful studies of formations are made for the purpose of determining the method of treatment, the degree of acid concentration and the time required.

All these developments have been made by Dowell, Incorporated, according to O. N. Maness, Long Beach District Manager. This Company controls the process of making inhibited hydrochloric acid of the proper concentration for reacting on limestone and dolomitic formations. Extensive researches and wide practical experience enable the company's engineers to recommend and supervise the correct treatment.

LOS ANGELES BASIN WILDCATS

Los Angeles County

Area	Well	No.	Section	Depth	Status
Brea	Pressel, Perry, Tull	1	30, 2-9	4560	Idle
Castaic	Royal Land Corp.	1	8, 4-17	350	Drilling
Gardena	The Texas Co., Gardena	5-1	30, 3-13	7885	Abandoned
La Mirada	Carmenita Oil Co., Ravera	1	21, 3-11		Rigging up
Monterey Park	Monte Cristo, Garvey	1	27, 1-2	4240	Idle
Mint Canyon	Christien, J. P.	1	7, 4-14		Rig
	Mint Canyon	1	33, 5-14	1750	Drilling
Newhall	West Coast Dev. Co.	1	27, 4-16	1300	Idle
	Bardsdall Oil Co., R.S.F.	2	26, 4-17	6712	Flowing 560b/d
Palmdale	Antelope Valley Pet.	1	17, 6-12	50	Tech. Spud.
Palos Verdes	Gene McLaren	1	27, 4-14	3992	Idle
	Hunter, Devlin et al	1	17, 4-14	5500	Plug 4500—Idle
	Rolling Hills Pet.	1	27, 4-14	3910	Drilling
Pico	British Am. O. P. Co.	1	12, 2-12	3990	Idle
	A. S. Johnston, Univ. Cons., Pico	1	5, 2-11	2950	Drilling
Pico Canyon	Burt, A. G.	1	36, 4-17	2550	Idle
Towsley Canyon	Towsley Canyon Oil Co.	1	8, 3-16	4100	Testing
W. Long Beach	Alford Dev. Co., C. Y.	1	22, 4-13	6250	Idle
	Orange County				
Anaheim	Shell Oil Co., Harbeson	1	9, 4-10	8606	Idle
	San Bernardino				
Chino	Selegna Drlg. & Prod. Co.	1	12, 3-8	3135	Idle
	So. Counties Pet. & Drlg. Co.	1	26, 2-8		Rig

NORTHERN COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Glenn	Ohio Oil Co., Willard	1	18, 20-2	4505	Stopped flowing
	Willard	2	18, 20-2		Rigging up
Humboldt	The Texas Co., Eureka	2	22, 3-1	7708	Plug 6473-shut in
Merced	Amerada Pet. Co., Carano	1	19, 10-11	8385	Abandoned
Monterey	Anderson, A. A., Hillman	1	15, 24-14	4005	Idle
	Elba Oil Co.	1	6, 13-2	4009	Rig blew down
San Joaquin	Standard Oil Co., Weyl Zuckerman	1	25, 2-4	8275	Drilling
San Mateo	Wilshire Oil Co., Cowell	1	20, 6-5	7750	Drilling
Solano	Amerada Pet. Co., McCormick	1	1, 3-2	4385	Completed—gas
Sutter	Buttes Oil Fields, Ltd.	3	2, 15-1	6954	Completing as gas well

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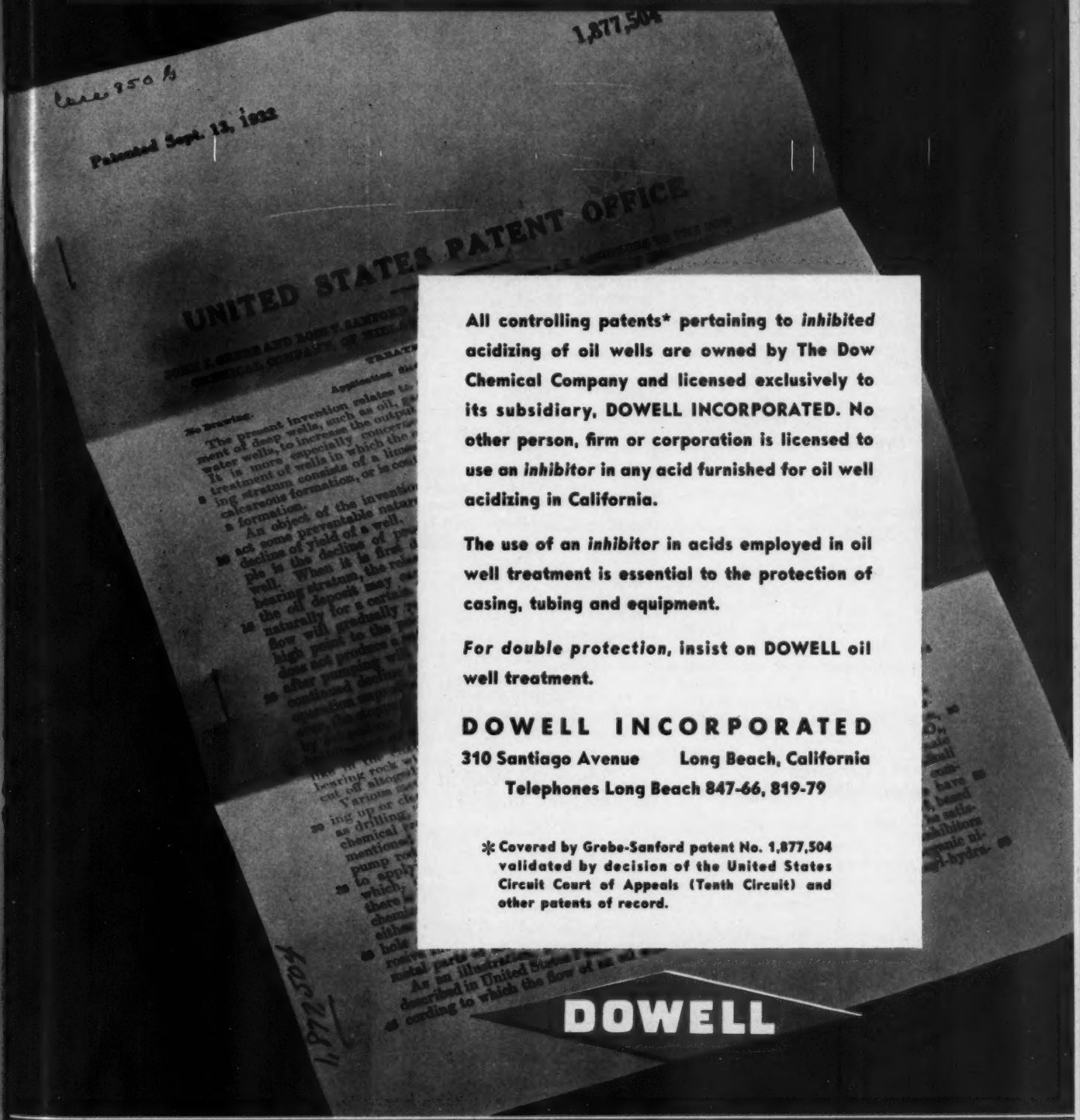

All controlling patents* pertaining to *inhibited* acidizing of oil wells are owned by The Dow Chemical Company and licensed exclusively to its subsidiary, DOWELL INCORPORATED. No other person, firm or corporation is licensed to use an *inhibitor* in any acid furnished for oil well acidizing in California.

The use of an *inhibitor* in acids employed in oil well treatment is essential to the protection of casing, tubing and equipment.

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DOWELL INCORPORATED

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Telephones Long Beach 847-66, 819-79

*** Covered by Grebe-Sanford patent No. 1,877,504 validated by decision of the United States Circuit Court of Appeals (Tenth Circuit) and other patents of record.**

DOWELL

DOWELL INCORPORATED

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OIL AND GAS WELL CHEMICAL SERVICE

San Joaquin Valley

N. Fruitvale Outpost Pumping 33 Bbls.

Only small production was obtained in the completion of California Western's outpost well near the west quarter corner of section 14, 29-27 north of Fruitvale. With the bottom of the hole at 3520 ft., 8⅝-in. casing was set at 3420 ft. and a perforated liner landed on bottom. The 33 bbl. rate at which the well pumped may improve if sand trouble can be successfully overcome.

Giusti No. 1, Pacific Oil & Gas Development Co.'s original extension well, is now on settled production at the rate of 90 bbls. per day with the cut down to 2%.

Offsetting to the west, Western Gulf Oil Co. brought in KCL B-32 from 3034 ft. flowing 450 bbls. a day of 17 gravity oil before sanding up.

New projects in the field are Western Gulf's KCL B-33 in sec. 22 and Pacific O. & G. Development Co:'s Giusti No. 2 in sec. 14.

Test Show at 3360 In Sec. 20, 28-27

In sec. 20, 28-27, near Kern Front, A. J. Rubenstein & Associates bottomed Kelley No. 2 at 3360 ft. and are testing showings cored below the shoe of the casing set at 3270 ft.

California Star Oil Co. has spudded well No. 6-80 in the southwest quarter in sec. 22, 28-27.

Richfield's Elk Hills Crampton 1-D-A Small

Richfield's latest Elks Hills well, Crampton 1-D-A in sec. 1, 31-24, is now on the beam for 60 bbls. cutting 85%. The Company has made two more locations in the same section.

In the next section to the north, Standard Oil Co. is putting Tupman 2-14 on the pump from a total depth of 2995 ft.

Wood-Callahan Drilling No. 2 in West Edison

In the West Edison field, Wood-Callahan Oil Co. is drilling its second well on the sec. 21 community lease adjoining the No. 1 well completed last December from the redrilled depth of 3573 ft. pumping 115 bbls.

High Water Cut in KNDA 4-18J Workover

Two wells are now producing from the Avenal sand on the North Dome of Kettleman Hills. Recompleting No. 4-18J in sec. 18, 21-17, KNDA obtained a gross flow of 1488 bbls. with a 67% salt water cut. This well was the first in the field to produce from the Eocene when on production test last summer it flower 1200 bbls. per day of clean oil before being carried on as a deep test. When an impossible fishing job precluded further exploration below 11,746 ft., the hole was plugged to 10,810 ft. where a string of 4½-in casing including 40 ft. of perforations was landed and cemented at 10,770 ft. Although the source of the water is not positively known, it is considered probable that the casing cement job has failed rather than the bottom plug.

Second well in the new horizon was Superior Oil Co.'s Huffman No. 5 in section 29, 21-17, which deepened from 8680 ft. to 10,746 ft. A ten-foot cement plug was placed in the bottom and a 695 ft. securaloy liner including 415 ft. perforated landed at 10,735 ft. and cemented through perforations at 10,320 ft. On a preliminary drill pipe test with packer set at 9975 ft. the well flowed 225 bbls. of 47 gravity clean oil in 21 hours and gas at the rate of 10,000,000 cu. ft. After this demonstration, tubing was run and the well completed in the conventional manner, flowing 563 bbls. of 46.5 gravity oil and approximately 22,000,000 cu. ft. gas through a one-inch bean under 1100 lbs. flow pressure.

Get Small Oil Well in McVan Sec. 28, 27-27

A small well was completed in the McVan area by H. W. Baker in sec. 28, 27-27 while in section 10, Golden Bear Oil Co. encountered only stringers of oil sand and abandoned at 1505 ft. Bargol Oil's Claflin No. 2, another section 10 test, is now the district's only active project.

Texaco Drops Bastian 1; Walker Is Barren at 4620

Near the south tip of Mountain View, Texas Co. Bastian No. 1, sec. 34, 30-29, entered the Walker formation at 4400 ft. and abandoned after penetrating the schist basement 30 ft. to 4620 ft. Sands productive in the Mountain View field proved to be barren on formation tests.

Belridge Adds Two in Sec. 27, 27-20; 28

Belridge Oil Co. brought in two new producers from the Wagon Wheel horizon in North Belridge recently. Well No. 61 in sec. 27, 27-20 was completed as one of the field's smallest wells with a flow of only slightly over 100 bbls. cutting 35% with 2,100,000 cu. ft. of gas, while No. 1, sec. 28, is on for 1075 bbls of 34.7 gravity clean oil and 4,650,000 cu. ft. gas. Well No. 26 is being started in sec. 35.

With No. 1A now drilling below 7539 ft., Richfield Oil Corp. is preparing to drill No. 2 in the area opened up by Texas Co. Martin No. 1 last fall in sec. 22, 27-20. After coring the top of the Wagon Wheel in Martin No. 2 at 8050 ft., Texaco is coring the last few ft. of oil sand before completing at approximately 8500 ft. Martin No. 3 is still in the Miocene at 5978 ft.

In sec. 34, Reward Oil Co. is setting pipe in Well No. 7 after encountering the zone at 8250 ft.

Tidewater Associated has two wells in pay on its North Belridge lease in sec. 21, No. 1 recording the top at 8100 ft. and No 2 at 8130 ft.

Union Spuds in N.W. Sec. 15, 31-29

Union Oil Co. has spudded in a prospect well between the Mountain View field and Arvin, in the northwest corner of Section 15, 31-29. This wildcat, to be known as Berry No. 1, is beyond the south end of the field, between the recently completed Houchin well and the old producing area.

Standard Abandons Morris 1 at 11,468

Leaving Crusaders Oil Co. Muller No. 1 the only active wildcat in Tulare county, Standard has abandoned its Trico deep test, H. C. Morris No. 1 at 11,468 ft. Although by far the deepest test well drilled in the area, no showings of importance were found, even gas sands of the nearby field being barren.

Near Ducor, Crusaders Oil Muller No. 1 in sec. 1, 24-27 has been forced to temporarily suspend due to inclement weather.

Valley Floor Work Continues Actively

New development work in valley floor areas continues unabated with the starting of many new projects.

In the Greeley field, Standard Oil Co. is starting KLC 11-14 in the southeast corner of sec. 18, 29-26 and Ross No. 1 in sec. 20 near the big gasoline wells, Fleishaur Comm. No. 1 and KCL 11-9

General Petroleum is rigging up its second Wagner well in sec. 35, 28-25 in the newly discovered Rio Bravo field.

At Ten Section, Shell completed KCL B-86, sec. 25, 30-25 from 8220 ft. with an initial yield of 2000 bbls. a day and 1,300,000 cu. ft. of gas, and started work on KCL A-41 which will be drilled in the southwest quarter of sec. 29, 30-26.

In the Canal field, newest of California's major discoveries, Ohio Oil has brought in a second excellent producer in KCL E-4, sec. 13, 30-25. An easterly offset to E-3, discoverer of the field, No. 4 was bottomed at 8177 ft. in 97 ft. of good oil sand and completed flowing 2184 bbls. of 35 gravity clean oil and 1,700,000 ft. of gas. Equipment has been moved to E-5 which is being rigged up in sec. 14, 30-25.

Shell Oil Co. KCL A-72 in sec. 14 successfully sidetracked the fish and has cored into the "Canal Zone" at 8115 ft. 7-in. casing is standing cemented at 8108 ft.

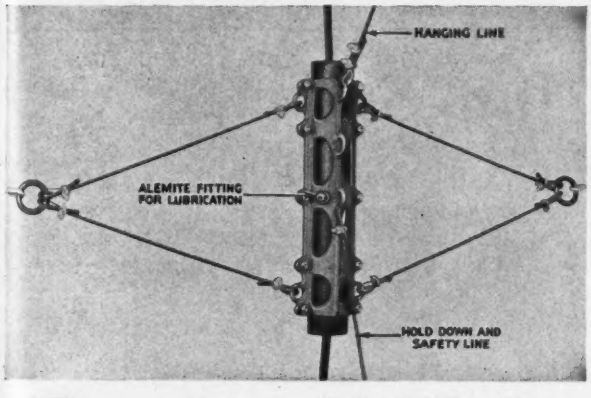
Fresno Wildcats Miss Oil Sand

Two Fresno county exploratory wells of major importance have been recently given up. S. P. L. No. 4 of Western Gulf Oil Co., located in sec. 3, 17-15 in the Cantua Creek area cored the Temblor sand at 6450 ft. and abandoned when this horizon was found to contain no oil. S. P. L. No. 3 a short distance to the south encountered an apparently edge condition, producing approximately 300 bbls. per day of light oil plus a like amount of water. As Nos. 1 and 2 were drilled more than a mile to the south and east, both finding the Temblor barren, it seems that the company will be forced to continue the search with at least one more test, locating either due east or due west of No. 3. No. 4 cored the Temblor at about the same depth as No. 1 and 100 ft. lower than No. 3, indicating that a test of the Eocene would not warrant the additional expense. The fact that both No. 1 and No. 3 recovered poorly saturated oil sand in the lower horizon, together with the lower Miocene oil obtained in the third test, puts the operators in the position of holding the lion by the tail and not being able to let go.

In the Tranquility area, near San Joaquin, Union Oil Co. has abandoned Nicholson No. 1 in sec. 17, 15-15 when both Miocene and Eocene series were found to be barren. The hole was bottomed at 7052 ft. after penetrating the Domengine 100 ft.

N. Dominion Tests To Be Continued

Dr. F. M. Pottenger, Los Angeles Sanitorium operator, is continuing his North Dominion exploration work with Orcier No. 1 located in section 34, 25-28. His first venture, Girard No. 1 in sec. 3, 26-28, encountered the Walker at 750 ft. and was abandoned at 1041 ft. A modern motorized portable rig is being used by Hall-Baker who are drilling the wells under contract.



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Devil's Den Activity At Lowest Point

Of the three wells in the vicinity of Devil's Den, two are idle, and the third just recovered from a fishing job. On the Alferitz lease in sec. 14, 25-18, Gibson Oil Co. is awaiting better road conditions before continuing with No. 3 which has not yet reached 100 ft. Little Major Oil Co. has indefinitely suspended Jester No. 1, sec. 36, 25-18 at 250 ft. Having recovered all the drill pipe fish, Amerada Pet. is just getting under way again after having been tied up at 6717 ft.

Resume Redrilling R. Mountain Outpost

Coast Exploration Co. No. 1, northwest outpost well at Round Mountain, has been held up with a fishing job at 1865 ft. but is now redrilling within a few feet of the old bottom. The well is located in the center of the northwest quarter of the section.

Argo Petroleum Corp., Farnsworth 1-A, sec. 11, 26-20 at Lost Hills, cored the top of the No. 4 zone oil sand at 1270 and has set casing preparatory to making a production test.

Rio Bravo Wells Set Drilling Record

Superior Oil Co. is now on the inside track to get the next producer in the world's deepest oil field. Wagner No. 1 is now below 10,900 ft. and is expected to reach the Rio Bravo sand within the next 400 ft. which at the present rate will take less than a week. A southeasterly offset to Union's Kernco No. 1 discovery well, the top of the zone should be reached at approximately the same depth, 11,225 ft. No cores have been taken, emphasis having been placed on speed and keeping the hole straight.

Famous in 1937 as being the world's deepest field, Rio Bravo in 1938 is receiving the attention of the entire oil industry because of the rapidity with which wells are drilled. The following comparison of depths with spudding dates will illustrate the fact that maybe 11,300 ft. isn't so deep after all. Depths are as of Feb. 17th.

General Pet. Corp. Wagner No. 1, 6640 ft. Spud Jan. 23.

Geo. F. Getty, Inc. Ramsey No. 1, 6605 ft. Spud Jan. 20.

Superior Oil Co. Wagner No. 1, 10,675 ft. Spud Dec. 12.

Superior, Oil Co. Wagner No. 2, 7360 ft. Spud Jan. 28.

Superior Oil Co. Geissinger No. 1, 9605 ft. Spud Jan. 5.

Superior Oil Co. Ruhl No. 1, 9050 ft. Spud Jan. 15.

Union Oil Co. Kernco No. 2, 10,005 ft. Spud Dec. 7.

Each of these wells has set 2000 ft. of either 11¾-in. or 13⅜-in. casing.

Temblor Hills Test Is Small Heavy Oil Well

Chico Martinez Oil Co. has apparently found a productive spot in the Temblor Hills where Exeter No. 1 has been completed pumping 50 bbls. of 14 gravity oil with a 20% cut. Total depth of the hole is 1065 ft. with the last 15 ft. plugged off.

Twistoff Delays Shell San Emigdio

A twist off has temporarily held up drilling Shell Oil Co.'s San Emigdio test well, KCL A-1 in sec. 26, 11-22. With bottom at 7670 ft., the top of the fish has been located at 2810 ft.

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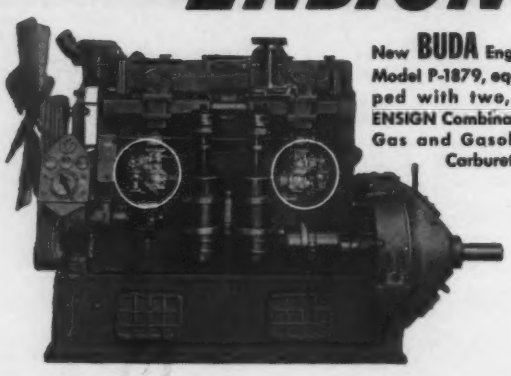

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Fish Delays Pure On S. P. Sec. 31, 18-17

East of Coalinga, Pure Oil Co., operating on S. P. Land Co. acreage in sec. 31, 18-17, has been slowed by the loss of bit cones in the hole. When last reported at 10,420 ft. formation continued to be hard brown sandy shale.

South of Coalinga, Petroleum Securities' Gatchell No. 2, sec. 18, 20-16, is coring ahead below 5850 ft. after topping the Kettleman sand at slightly below 4900 ft.

Four New Wildcats on East Side of Valley

The so-called business recession has not hit the east side of the San Joaquin valley, there being four new wildcats started within a two week period.

East of Edison, Ray W. Stevens has built a rig for a well in sec. 22, 30-30; while near the field Wood-Callahan Oil Co. has a derrick for Porter No. 1.

In the Poso Creek area Garven and Reynolds are preparing to drill well No. 1 in sec. 30, 27-27.

Seek Shallow Pay East of S. Belridge

East of the South Belridge shallow field, Dorothy Taylor, Ltd., is drilling in sec. 12, 29-21 on the F. K. Land Company lease. Although a standard derrick is being used, it is planned to explore only for the shallow zones above 2000 ft. at the present time.

Ohio Oil Co. is preparing to deepen Ford Permit No. 1, a validation hole drilled to 2030 ft. in sec. 6, 29-22 last fall.

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Cantua Creek	Western Gulf SPL	4	3, 17-15	6755	Abandoned
Coalinga	Conlon, J. M.	1	25, 19-14		Rig
	Petroleum Sec.. Gatchell	2	18, 20-16	5750	Drilling
	Shell Oil Co.	36-1	36, 19-14		Rig
	Wilcox, J. F.	6	11, 20-14	350	Idle
E. Coalinga	Pure Oil Co., SPL	1	31, 18-17	10475	Drilling
Ciervo	Superior O. Co., C.U.P.	1	20, 16-13	4435	Drilling
Clovis	Central Valley Oil Co.	1	1, 12-20	495	Idle
Jacalitos Hills	Jacalitos Pet. Co.	1	14, 21-15	5745	Redrilling
	Dauphin Dev. Co., Boone	1	30, 21-14	3778	Idle
San Joaquin	Union Oil Co., Nicholson	1	17, 15-15	7060	Abandoned
	Kern County				
Arvin	General Pet. Co., Pauley	1	22, 31-29	500	Idle
	Petrex, Inc.	1	32, 31-30	3375	Drilling
	Union Oil Co., Berry	1	15, 31-29	1350	Drilling
Belridge	General Pet., St. Helens	1	12, 28-20	7575	Drilling
Buena Vista	Ohio Oil Co., KCL	A-8	32, 31-26	8035	Drilling
Devils Den	Amerada Pet. Co., Beer	5	22, 26-19	6805	Fishing
	Gibson Oil Co., Alferitz	3	14, 25-18	35	Idle
	Little Major Oil Co.	1	36, 25-18	250	Idle
Dominion	Dean, Geo. W.	1	26, 26-28		Rig
	Pottenger, F. M., Girard	1	35, 26-28	1040	Abandoned
	Orcier	1	34, 25-28	1000	Drilling
	Ring Oil Co., KCL	1	16, 26-28	1800	Abandoned
Edison	Johnson, G.W. Brown-Paulette	1	33, 29-30	1027	Idle
	Stevens, Ray	1	22, 30-30		Rig
	Wood, Callahan, Porter	1	20, 30-29		Rig
Fruitvale	Shell Oil Co. KCL	A-58	29, 29-27	5950	Drilling
Grapevine	Honolulu Oil Co.	SPL-1	33, 12-19	8005	Abandoned
	Richfield Oil Corp.	KCL-1	28, 11-20		Grade
	The Petrol Corp.	32-2	32, 11-19	6020	Drilling
	Universal Cons. Oil Co.	1	33, 11-19	4990	Plug 4635
Greeley	Continental Oil Co. KCL	D-1	10, 30-26	6800	Drilling
Lerdo	Standard Oil Co. KCL	18-1	29, 28-26		Rig
Mt. View	Texas Co., Bastian	1	34, 30-29	4620	Abandoned
Poso Creek	Garven & Reynolds	1	30, 27-27		
San Emigdio	Shell Oil Co. KCL	4-26	26, 11-22	7670	Fishing
Temblor Hills	Chico Martinez-Exeter	2	1, 29-20	1066	Pumping
Wasco	Continental Oil Co. KCL	A-2	8, 27-24	13470	Drilling
	Standard Oil Co., Randolph	2	14, 27-23	9537	Stdg. Cmtd.
	Kings County				
Pyramid Hills	Pyramid Prod. Co., Retherford	1	21, 24-18	2350	Drilling
Kettleman	Temblor Oil Co., Bunting	1	25, 23-18	9138	Plug 7815—Idle
	Tulare County				
Ducor	Crusaders Oil Co.	1	1, 24-27	57	Drilling

Coastal District

Heavy Oil Gusher In N. Sec. 25, 10-34

R. R. Bush Oil Co. and Hancock Oil Co. operating jointly completed what is perhaps the largest low gravity well in the state of California when Rosenbloom No. 2, located in the center of the north half of sec. 25, 10-34, was given a 17-hour flow test producing 3200 bbls., a rate of 4500 bbls. per day. This flow of 14 gravity oil was made through 3-in. tubing without beans, but is not considered representative of the possibilities of the well as the rate was still increasing when it was necessary to shut in because of lack of storage. Witnesses to the test estimate the capacity at 8000 bbls.

Situated in the Adam discovery area, the hole was bottomed at 4435 ft. and is producing from nearly 1000 ft. of Monterey which was topped at 3470 ft. Indicative of the speed with which Santa Maria Valley wells are now drilled, the well was spudded January 17 and completed February 15. Surface casing was set at 718 ft., 9 in. water string cemented at 3470 ft. and 995 ft. of 7-in. liner landed on bottom at 4435 ft.

In the same section the combined operators are preparing to bring in Wylie No. 2 after setting 9-in. casing at 3202 ft. Brown No. 3 is spudding in while location has just been made for Bradley Lands No. 6 offsetting California Lands, Inc. Gallison No. 1 in section 26.

Two wells have recently been finished in sec. 27. Pacific Western Oil Co. Dal Porto No. 3 penetrated 13 ft. of Franciscan to bottom at 4198 ft. and established an 825 bbl. potential from 270 ft. of Monterey. On the Wisconsin-Waddell lease F. E. Jones with 370 ft. of formation open to 4600 ft. has brought in his first well with production as yet unestimated. Signal Oil & Gas Co. is pre-

paring to test Ramalho No. 2 after setting 8¾-in. casing at 4343 ft. Petroleum Equities Co. Weber No. 1 is drilling below 3150 ft. and York Oil Co. Doane No. 2 is at 2450 ft.

On the Union Sugar property E. H. Moore, Inc., is making a production test in well No. E-13. Interval open is 5085 to 5230 ft.

Union Oil Co. brought in two new wells, Moretti No. 3, sec. 24, offsetting A. N. Macrate's Rice No. 2, and Wheat No. 1 in sec. 22, an offset to Acquistapace No. 1. The Moretti well was finished at 2805 ft. pumping at the rate of 270 bbls. a day while Wheat No. 1, located where the Monterey series is thicker, was completed from 4181 ft. for better than 500 bbls.

Captain Geo. W. Dean of the Los Angeles Fire Department, is sponsoring a new wildcat test east of the Dominion area in sec. 26, 26-28. Derrick is up and drilling for the Vedder sand is expected to be started within a few days.

Good Shallow Shows In Carpinteria Test

Starting almost immediately in the Monterey shales, Carpinteria Oil Co., drilling in the town of Carpinteria, is now below 900 ft. Heavy oil showings have already been noted on the ditch and the well is considered to have better than a fair chance of obtaining production. The location is not far distant from a Continental Oil Co. well which blew out several years ago.

Two Wells Drilling In Oxnard-Saticoy

Only two wells are now active in the Oxnard-Saticoy area. Texas Co. carried Edwards No. 1 to 6111 ft. and plugged back to 5913 ft. to test a heavy oil horizon encountered in the Miocene. After setting the plug, the drill pipe "froze," necessitating its removal a piece at a time. The Walter G. Rowe well in sec. 15, 1-22, in which several major companies have contributed "dry hole money," is drilling in gray sand and shells below 3625 ft.

Mystery Well Drilling In San Mateo County

An interesting and mysterious exploratory well is being drilled by the Wilshire Oil Co. at Half Moon Bay in San Mateo county. No information of any kind is released on this well by the company and rumors of good oil and gas showings are neither confirmed nor denied by officials. Too distant to be regularly scouted, it is only occasionally that reports are received from neutral observers, who incidentally are not allowed close to the rig. Most recent drill pipe count places the bottom at 7800 ft.

COASTAL COUNTIES WILDCATS

Santa Barbara County

Area	Well	No.	Section	Depth	Status
Carpinteria	Carpinteria Oil Co.	1	32, 4-25	1050	Drilling
Cat Canyon	Standard Oil Co., Los Flores	1	27, 9-33	5031	Drilling
Gaviota	Gaviota Oil Co., Hollister	1	35, 5-33	3205	Shut in-Gasser
	Wilshire Oil Co., Hollister	1	35, 5-33	2553	Drilling
Refugio	Tweedy, A. E., Penn.	1	34, 5-31	1700	Idle
Santa Rita	O. C. Field Gas. Co., S.R.	1	11, 7-33	3360	Redrilling
Summerland	Gauthier Oil Co.	17–1	22, 4-26	150	Drilling

San Luis Obispo County

Cuyama	Little Cuyama Oil Co.	4–1	4, 10-26	1500	Abandoned
Edna	Loma Grande Oil Co., Lewis	1	28, 31-13		Rig
Elkhorn	Calif. Prod. Co.	1	6, 10-24	1550	Drilling
	Western Plains Oil Corp.	1	7, 31-21	4010	Cleaning out
Paso Robles	Ajax Land & Dev. Co., Moss	1	27, 26-13		Rig
	Vanguard Oil Co.	1	14, 27-14	4360	Drilling

Ventura County

Bardsdale	Little Canyon-Snodgrass	1	32, 4-19	1305	Idle
Camarillo	Richfield Oil Co., McFarland	1	13, 1-21	7883	Idle
	So. Calif. Drlg. Co., Daly	2	26, 2-21	3090	Idle
	The Texas Co., Edwards	1	19, 2-21	6111	Fishing
Oxnard	Oxnard Oil Co., Vanoni	1	10, 1-22	6302	Plug 6200—Idle
	Walter G. Rowe Johnson	1	15, 1-22	3450	Drilling
Ojai	High Mesa Oil Co.	1	16, 4-22	1301	Idle
Red Mountain	Arnett, Frank E.	3	15, 4-21	1167	Idle
Sespe	CommanderOilCo.,Temescal	7-F	13, 4-18	215	Idle
	Condor Oil Co.	1	6, 4-19	2195	Idle
	Garmack Oil Co., Orcutt	1	28, 5-19	565	Drilling
	Crosby	1	14, 4-19		Grade
	La Salle & Van Dissen	1	17, 5-19		Grade
	Skyline Oil Co.	6	13, 4-19	2750	Testing
	Speik Oil Co.	1	33, 5-19	3440	Idle
	Terry, Geo., et al	1	23, 5-20	1340	Idle
	Williamson Oil Co.	1	1, 4-20	540	Idle
Simi	Trucano, Germanina	1	5, 2-17	1007	Idle
South Mt.	The Texas Co., Richardson	5	13, 3-21	2675	Drilling
Tar Creek	Section 20 Oil Co.	1	20, 5-19	1580	Drilling
Timber Canyon	Stallings, Senter, Ahlberg	1	24, 4-21	675	Drilling

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California Crude Oil Production

For Three Weeks Ending February 18, 1938

Field	February Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	16,470	15,890	*580
Belridge—South	1,935	1,545	*390
Buena Vista	18,280	19,167	887
Canal	450	957	507
Coalinga—East-West	16,815	13,724	*3,091
Coffee Canyon	3,875	4,864	989
Edison	3,285	3,795	510
Elk Hills	8,695	10,820	2,125
Fruitvale	8,125	9,256	1,131
Greeley	4,045	3,479	*566
Kern Front	10,010	10,095	85
Kern River	5,275	2,454	*2,821
Kettleman No. Dome	80,855	79,795	*1,060
Lost Hills	4,940	3,680	*1,260
McKittrick	3,805	4,337	532
Midway	48,645	57,152	8,507
Mount Poso	17,145	19,709	2,564
Mountain View	13,800	13,897	97
Rio Bravo	450	2,572	2,122
Round Mountain	11,070	14,131	3,061
Ten Section	4,630	4,094	*536
Other Fields	2,575	2,944	369
TOTAL	285,175	298,357	13,182
Coastal Counties			
Elwood	6,430	7,716	1,286
Rincon	2,890	3,537	647
Santa Maria	8,775	5,456	*3,319
Santa Maira Valley	10,000	11,032	1,032
Santa Paula-Newhall	5,275	5,360	85
Ventura Avenue	34,095	36,200	2,105
Other Fields	6,625	8,064	1,439
TOTAL	74,090	77,365	3,275
Los Angeles Basin			
Alamitos-Seal Beach	8,950	9,504	554
Brea-Olinda	8,945	6,150	*21795
Coyote—East	3,080	3,880	800
Coyote—West	9,375	8,522	*853
Domingues	25,605	29,460	3,855
El Segundo	10,475	18,245	7,770
Huntington Beach—New	16,075	20,162	4,087
Huntington Beach—Old	14,680	16,124	1,444
Inglewood	16,030	15,889	*141
Long Beach	51,260	58,150	6,890
Montebello-Extension	7,880	8,929	1,049
Playa Del Rey	7,100	7,573	473
Richfield	8,725	9,618	893
Rosecrans-Athens	2,965	6,053	3,088
Santa Fe Springs	35,190	40,885	5,695
Torrance	6,885	7,587	702
Wilmington	52,790	87,943	35,153
Other Fields	2,180	2,274	94
TOTAL	288,190	356,948	68,758
STATE TOTAL	647,455	732,670	85,215

*—Shortage.

Three Coast Wildcats Hold Drilling Interest

Three important new wildcats are projected in coast districts for the immediate future. Near Orcutt in Santa Maria Valley, Bankline will drill its first exploratory well in some time. The location chosen falls on the Silva property 990 ft. south and 990 ft. east from the west quarter corner of sec. 7, 9-33.

Pooling their interests in a common test, Tide Water Associated, Richfield and Union Oil Companies will drill on land held by Peter Ferrini in lot 13 of the old Rancho Guadalupe Spanish grant. The well will be located in the northwest quarter of sec. 15, 10-35.

Continental Oil Co., already one of the most active companies in exploration work, will drill near the north quarter corner of sec. 23, 4-19 in the Hopper Canyon area of Ventura county.

State Drilling Report

Field	Company	Well	No.	Sec.	Twp.	Range
	NEW WELLS					
Wilmington	General Petroleum Corp.	Harbor Comm.	15	2	5S	13W
	Gus Pongratz	Ashbridge Comm.	2	32	4S	13W
		Gilmore	2	32	4S	13W
	Union Pacific Railroad Co.	U. P. 83, 84, E-3, E-4, E-5, E-6, E-7 & E-8	3		5S	13W
	The Hancock Oil Co.	Harbor F-8, B-9, B-10, B-11, & B-12	2		5S	13W
	Richfield Oil Corp.	Victory	1	35	4S	13W
	D. D. Dunlap Oil Co.		11	2	5S	13W
	General Petroleum Corp.	S. P.	6	2	5S	13W
Rosecrans	Barnsdall Oil Co.	O'Dea	20	18	3S	13W
Torrance	Doyle Petroleum Corp.	Neill	1	14	4S	14W
			1	23	4S	14W
Coyote Hills	Standard Oil Co.	Emery	65	24	3S	11W
Long Beach	Signal Oil and Gas Co.	Pacific Electric	1	13	4S	13W
	Hilldon Oil Co.	Flood Control	2	13	4S	13W
Santa Maria Valley	California Lands, Inc.	Jones-Gallison	3	26	10N	31W
	Hancock and Bush	Brown	3	25	10N	34W
	York Oil Co.	Doane	2	27	10N	34W
Midway	Standard Oil Co.		35	23	32S	24E
Sunset	Otis Hoyt	Otis Hoyt Maricopa	9	7	11N	23W
Belridge	Dorothy Taylor, Ltd.	Dorothy Taylor, Ltd.	1	12	29S	21E
Edison	Wood-Callahan	21 Community	2	21	30S	29E
Round Mountain	Coast Exploration Co.	Coast	1	6	28S	29E
Kern County	Dr. F. M. Pottenger	Orcier	1	34	25S	28E
Ten Section	Shell Oil Co.	KCL-B	81-31	31	30S	26E
Coalinga	Shell Oil Co.	Thirty-Six	1	36	19S	14E
	James M. Conlon Co.		1	25	19S	14E
Ventura	Shell Oil Co.	Taylor	94	20	3N	23W
Capitan	General Petroleum Corp.	Erburu	22	32	5N	30W
Greeley	Standard Oil Co.	Rose	1	20	29S	26E
Kern River	California Star Oil Co.		6-80	22	28S	27E
Fruitvale	Western Gulf Oil Co.		33-KCL-B	22	29S	27E
Ten Section	Shell Oil Co.	KCL-A	41-29	29	30S	26E
Round Mountain	Dwight G. Vedder	Bell	2	12	28S	28E
Coalinga	Amity Oil Co.		10	1	20S	14E
Kettleman North	Standard Oil Co.		85	7	22S	18E
	DEEPEN OR REDRILL					
Long Beach	Richfield Oil Corp.	Malcolm-Davis	6	19	4S	12W
	The Texas Co.	Walker	1-A	19	4S	12W
Montebello	The Texas Co.	Prugh	10	6	2S	11W
Torrance	Harry Fisher	Washburn	1	23	4S	14W
	M & M Oil Co.	Lomita	6	23	4S	14W
	Patton Oil Co.	Meacham	1	15	4S	14W
	Pilgrim Oil Co.	Torrance	21	23	4S	14W
	C. C. M. O. Co.	Torrance	14	14	4S	14W
Santa Fe Springs	Wilshire Oil Co., Inc.	Wilshire-Cecilia	2	6	3S	11W
Huntington Beach	The Texas Co.	Towers	5	35	5S	11W
Richfield	The Texas Co.	Isaac	2	33	3S	9W
Wilmington	George F. Getty, Inc.		W-5	33	4S	13W
Inglewood	Don Angle	Smith	1	7	2S	14W
Sespe	Topa Topa Oil Co.		3	33	5N	19W
Elwood	Honolulu Oil Corp.		90-4	15	4N	29W
Midway	C. C. M. O. Co.		20	21	32S	23E
	Pyramid Oil Co.		5	26	31S	22E
Mt. Poso	The Texas Co.	Alta Vedder	1, 2	4	27S	28E
Round Mountain	Shell Oil Co.	Caldwell	13	7	28S	29E
Mountain View	Shell Oil Co.	Bahrenburg	3	32	30S	29E
Fruitvale	H. L. J. Oil Co.	H. L. J.	1	23	29S	27E
Kettleman North	K. N. D. A.		25	28	21S	17E
			83	30	21S	17E
Richfield	Congress Oil Co.		1	36	3S	9W
Santa Fe Springs	General Petroleum Corp.	Santa Fe	231	5	3S	11W
Potrero	Beloil Corp., Ltd.	Grant-Inglewood	5	28	2S	14W
Torrance	Coast Line Oil Co.	McBride	1	14	4S	14W
Long Beach	Exeter Oil Co., Ltd.	Hoyt	11	29	4S	12W
	Shell Oil Co.	Goddard	1	29	4S	12W
		Patton-Wilson	9	29	4S	12W
Rincon	General Petroleum Corp.	Ferguson	3	8	3N	24W
Ventura	Shell Oil Co.	Taylor	65	29	3N	23W
Lompoc	O. C. Field Gasoline Corp.		2	6	7N	33W
Elwood	Barnsdall Oil Co.		88-9B	15	4N	29W
	Bankline Oil Co.		89-10	15	4N	29W
	Honolulu Oil Corp.		90-3 & 90-5	15	4N	29W
Santa Barbara County	Claude Fisher	Cuyama	1	28	11N	28W
Midway	Quality Oil Co.	W. P.	1-A	27	32S	23E
Kettleman North	Petroleum Securities Co.	Felix	3	35	21S	17E
	ABANDON					
Seal Beach	George F. Getty, Inc.	S. B.	8	3	5S	12W
Domingues	Shell Oil Co.	Reyes	6	33	3S	13W
Bardsdale	Elkins Ranch Co.	Elkins	4	5	3N	19W
San Luis Obispo County	Cuyama Oil Co.	Little Cuyama	1	3	10N	26W
			2	4	10N	26W
Midway	Honolulu Oil Corp.		34 & 61	6	32S	24E
Mountain View	The Texas Co.	Bastian	1	34	30S	29E
Whittier	Keystone-Montebello Oil Co.		1	9	2S	11W
Playa Del Rey	Herndon Development Co.	Embee	1	27	2S	15W
Long Beach	Richfield Oil Corp.	Hass	5	30	4S	12W
Simi	Richfield Oil Corp.	McFarland	1	13	2N	12W
Elk Hills	Richfield Oil Corp.	Crampton	9-D & 10-D	1	31S	24E
Midway	Tidewater Assoc. Oil Co.		93	34	31S	23E
Kern County	Shell Oil Co.	Keystone	1	4	26S	27E
Mountain View	Mohawk Petroleum Co.	Hood	3 & 9	30	30S	29E
Round Mountain	Harry Long		1	2	28S	28E
Poso Creek	Golden Bear Oil Co.	Siemon	3	10	27S	27E
Merced County	Amerada Petroleum Corp.	Carano	1	19	10S	11E
Fresno County	Union Oil Co.	Nicholson	1-17	17	15S	15E
	Western Gulf Oil Co.	S. P. Land Co.	4	3	17S	15E

Summary	Week of Feb. 19	Previous Week	To Date This Year	To Date Last Year
Total New Wells	19	27	158	167
Total Deepened or Redrilled	18	23	112	82
Total Abandoned	8	15	75	67

LAUGH THIS OFF

It has been reported that a certain Torrance driller stopped in at a Goodrich service station recently to have a patch placed over his left eye. Apparently he had had a big blow-out the night before.

And **Doc Curtis** absent-mindedly taking the pulse of a Brea oil man who was slightly under the weather, remarked dreamily, "Either you're dead, buddy, or my watch has stopped."

Which recalls **Claude Emmon's** classic about the youngster who described a stethoscope as a "thing for seeing into people's chests with your ears."

Dave Kilgour, by the way, emphatically denies the contention that the average Scotchman measures nine years from tip to tip.

Also, while it is a terrible thing to float alone on the middle of the ocean, it is really a pleasant experience to float a loan from one of these Federal Credit Unions.

And **Johnny Quayle** says the only guy who is ever penalized for taking too much interest in his business is a loan shark.

We have just heard of a pumper at Montebello who has lived in a kitchenette so long that the poor fellow has developed very close veins.

The place was actually so small he had to use condensed milk.

Two men were recently arrested for obtaining money from oil workers under false pretenses. You understand, of course, that it wasn't the oil workers who were under false pretenses. These psuedo financiers were supposed to build homes for the boys who gave the cash, but it seems they never got any further than the frame-up.

As a special inducement, we understand they mad no charge for shingling. The shingles as usual being on the house.

And; according to **Andy Hazard,** the Long Beach rousty who dropped a stand of four-inch pipe on his foot, has taken a few days off to vituperate.

"I sure get a kick out of this job," said the field pumper as he cranked the old gas engine.

An anonymous writer has just forwarded a description of one of his associates, whom he is generous enough not to name, but he says with some vehemence that the guy is so narrow-minded he can look through a keyhole with both eyes at the same time.

And the ignorance of some oil men is simply appalling. We attended a banquet a few nights ago, and are positive that the bird on our left was singing "The Spar Strangled Banana."

Then there was **Elwood Hedges'** story of the fellow who learned to draw while he was waiting for wrong numbers.

By the way, have you ever noticed that among the general run of oil workers, you can always tell a petroleum engineer or a production foreman—but not much.

Harry Lee, the oil industry's leading sportsman, tells us that there are over 0,000 horses racing in this country. Hope he didn't include that cinch we got from the elevator operator last week. It was entered in the fourth race, and came second last in the fifth.

And the schoolboy son of a local safety expert wrote in his examination paper, "Artificial perspiration is a way to make people alive when they have only just died."

There was quite a ruckus going on down on Main Street a few days ago when **Bill Ackerman,** the world traveler and raconteur from San Francisco, was in town. Being a sympathetic sort of an individual, Bill made his footman stop the carriage, while he lighted to talk it over with the rioteers. "What's all the fuss about, my good man?" he inquired of a ruffled individual in the middle of the melee. "It's a dispute between the bosses and the workers," was the reply. "Why don't you try arbitration?" Bill asked next. You could have knocked him over with a Monroe Calculator when the guy exploded, "Heck! That's what started it."

All of which brings us once more to the end of our arduous stint. Remember that figures never lie until they get in the hands of a statistician.

And Job never had a fishing job on his hands.

Torrance Deep Zone Continues Prolific

Several deep sand wells have been completed in the newly developed Torrance "hot spot" in the vicinity of Narbonne and 233rd Sts. The best so far seems to have been obtained by Torrance Pet. Co. in Grubb No. 2 which was brought in from 4995 ft. with a 5¾-in. combination string perforated from the cementing point at 4845 ft. to bottom. On the pump the well is producing 200 bbls. a day of 27 gravity clean oil. Completing in the same manner from 5120 ft., Albertson Oil Co. No. 1 is pumping 100 bbls. cutting 40%. Other wells which have not yet cleaned up are those of Emerald Oil Co. and Patton Oil Co. which at last reports were pumping to the sump with no estimate of production. Twenty-five other wells are drilling for the new horizon.

Because of water trouble in wells cementing through perforations above the oil sands, and because the sand body contains streaks of gray, the Division of Oil & Gas in the future will require blank casing to be set on bottom and perforated in the hole opposite the intervals to be produced. Sufficient cement must be used to carry back to the last water shut off point.

W. Montebello Boom Is Getting Underway

The expected West Montebello deep drilling boom is at last getting under way with the starting of new wells south of the St. Helens Monterey lease by Union Oil Co. on the Howard and Wilcox properties. Independent operators who will drill soon are McVicar & Rood, who will deepen the abandoned Superior Oil Co. Manz No. 1, Gus Pongratz, Western States Drilling Co. and Bartholomae Oil Corp. St. Helens Monterey No. 24 is drilling below 4000 ft. and No. 25 is rigging up. The discovery well, Monterey No. 20, is flowing 600 bbls. of 39 gravity clean oil through a 44/64-in. bean under 900 lbs. pressure. Gas production is 3,200,000 cu. ft.

Texaco Abandons Gardena Comm. 1

An interesting Basin wildcat well, Texaco Co.'s Gardena Comm. No. 1, has just been abandoned. Located south of Rosecrans and west of Dominguez near the intersection of 168th St. and Figueroa, the hole was carried to 7885 ft. The Miocene, encountered somewhat lower than anticipated, failed to yield any oil showings.

Joins Fluor Corp.

P. E. Fluor, vice president and general manager of the Fluor Corp., Ltd., internationally known in the field of refining and natural gas construction and cooling tower fabrication, announces the addition to his sales staff of Milton Lewis, who will handle California refining construction work, as well as jobs outside the state.

Milton Lewis will be remembered by his many friends in California as having previously represented for some considerable period of time The Ralph M. Parsons Co., prior to which he was associated with the Southwestern Engineering Co. "Milt" Lewis' many friends will be happy to learn of this new association and to welcome him back into the official family of the California oil industry.

Second Alamitos Zone Tests Disappointing

Union Oil Co.'s test of the second Alamitos zone in Oil Operators No. 4 in the Long Beach northwest extension area proved something of a disappointment when, completed in the interval 4345 to 4408 ft., initial production was only 65 bbls. in eight hours pumping. In the same district Hilldon Oil Co. is drilling Flood Control No. 2 below 3747 ft. and John Abrams & Associates are deepening Willis No. 1 after having failed to find clean production from 4245 ft.

James H. Perkins Elected General Electric Director

At the meeting of the board of directors of the General Elctric Co. last week, James H. Perkins, chairman of the board of directors of the National City Bank of New York, was elected a director to fill a vacancy.

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Large map of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
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LAND MAPS

Large loose-leaf atlas of Kern County township maps. Shows owners, leases, wells. 106 indexed pages in cloth-covered binder. Revised to Feb. 1, 1938. $125.00.
Old Geological Survey folios, bulletins & prof. papers on Santa Maria, Coalinga, McKittrick, Midway, Puente, Cuyama, San Luis, Mother Lode, Tertiary Pectens, many others. Send for price-list. Earl M. Price & Co., Bakersfield, Calif. 3-20-d

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Oil Men's Calendar

March

7—Rochester, N. Y., American Society for Testing Materials, Spring Regional Meeting and Group Committee Meetings.

8—Long Beach, Calif., A. P. I., L. A. Basin Chapter, Division of Production, Shell Recreation Hall.

16-18—New Orleans, twenty-third annual meeting, American Association of Petroleum Geologists, Roosevelt Hotel.

21-25—Western Metal Congress, Biltmore Hotel, Los Angeles.

21-22—St. Louis, Mo., Liquefied Petroleum Gas Association, annual meeting.

23-25—Los Angeles, Calif. American Society of Mechanical Engineers.

April

4-6—Cincinnati, Ohio, A.G.A. Distribution Conference, Netherland Plaza.

13-15—Houston, Tex., Petroleum Industry Electrical Association.

17-21—Dallas, Tex., American Chemical Society.

19—Los Angeles, Spring meeting, Pacific Coast, district, A.P.I. Division of Production, Biltmore Hotel.

20-22—Buffalo, N. Y., American Institute Mining and Metallurgical Engineers, Open Hearth Conference.

25-27—Hot Springs, Ark., Western Petroleum Refiners Association annual meeting.

28-29—Pittsburgh, Pa. Spring meeting, Eastern District, A.P.I. Division of Production, William Penn Hotel.

May

11-13—Tulsa. Natural Gasoline Association, Hotel Tulsa.

12-14—Tulsa. National Oil Scouts Association of America.

14-21—Tulsa. International Petroleum Exposition.

(?)—New Orleans, La. American Gas Association. Natural Gas Department.

June

6—Houston, Tex. Oil Workers International Union.

20-24—St. Louis, Mo. American Society of Mechanical Engineers.

September

14-16—Santa Barbara, Calif., annual meeting Pacific Coast Gas Association, Biltmore Hotel.

Vol. 31 No. 5
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